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The IRON AGE

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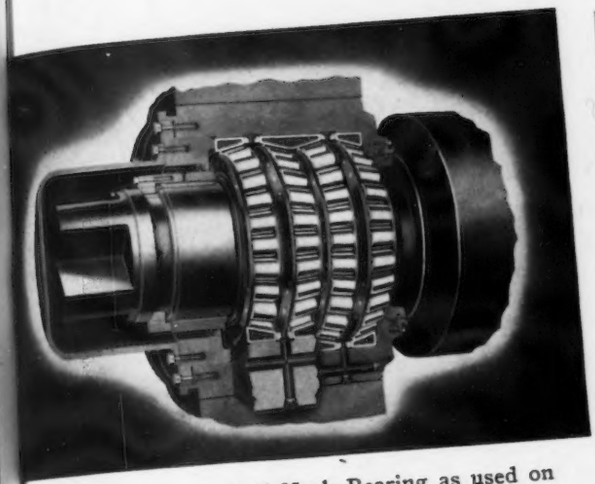
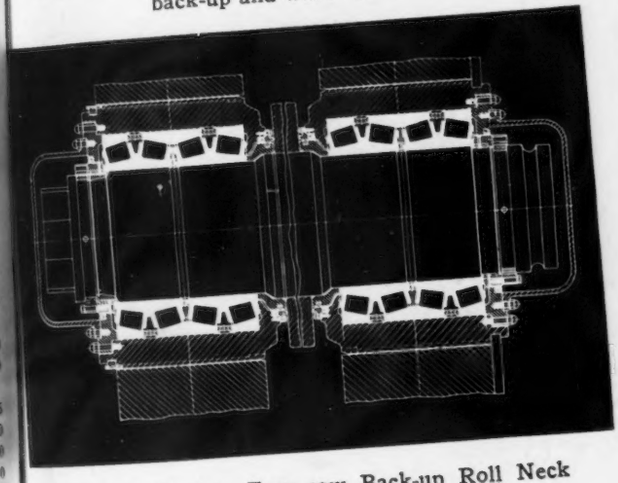


Timken Four-row Roll Neck Bearing as used on back-up and work rolls.



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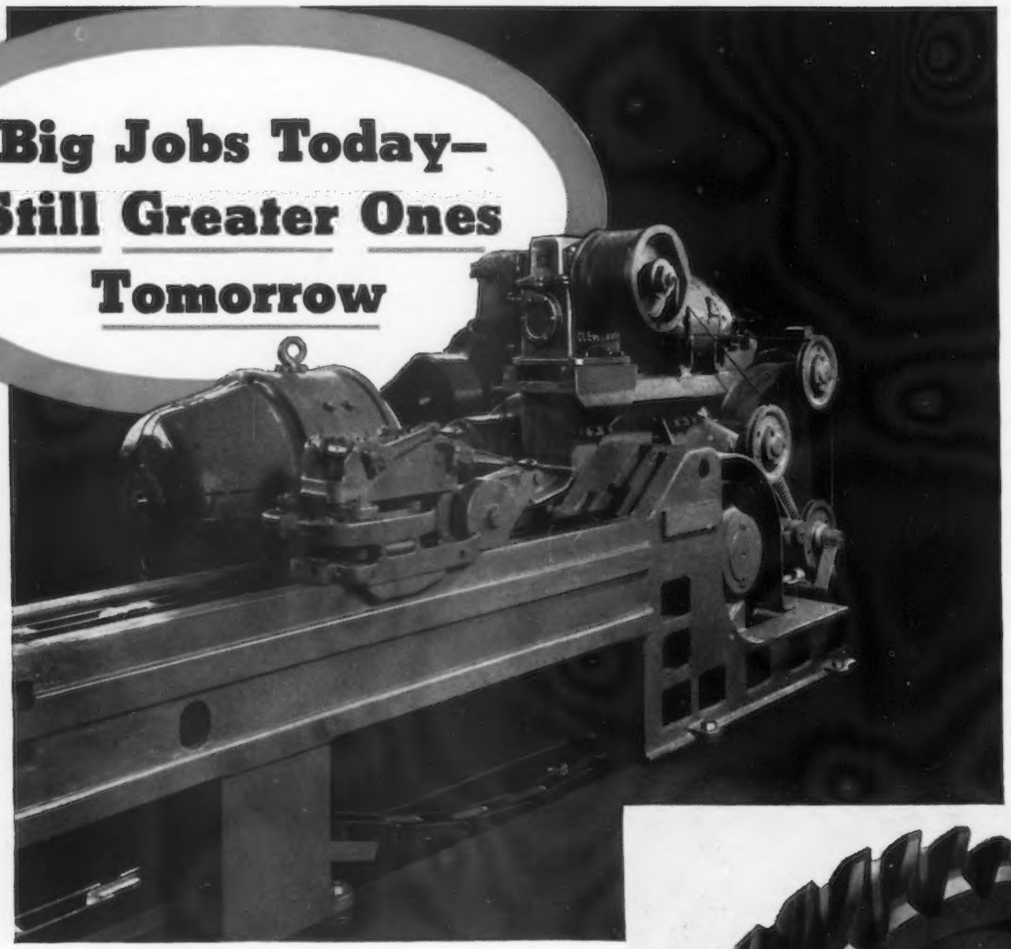

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United States Troops Advancing on Oran. Photo by U. S. Army Signal Corps.

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RYERSON STEEL-SERVICE

THE IRON AGE

MARCH 11, 1943

ESTABLISHED 1855

Freedom From Want

OF the four freedoms enunciated after the historic Churchill-Roosevelt Atlantic Charter meeting, two are basic and long accepted fundamentals of freedom and the other two are euphemistic platitudes.

No one in America, for example, will take exception to the goal of free speech or of freedom of religious belief. These two basic principles of democracy were not originated at the historic shipboard meeting of the eminent British Premier and the equally eminent American President in 1941, but were specifically stated in the Bill of Rights, 151 years ago.

Two new freedoms were added to the old established two, in order to bring them and us up to date. These were the freedom from want and the freedom from fear.

Our illustrious ancestors of a century and a half ago did not deal in generalities. There was nothing left to the imagination, for example, in respect to the two freedoms which they set forth. People could understand what they meant.

Our ancestors were realistic. When they spoke of freedom of speech and freedom of religion, one could understand exactly what they meant. And they were in position to "deliver the goods" on these items because such things could be attained by legislation.

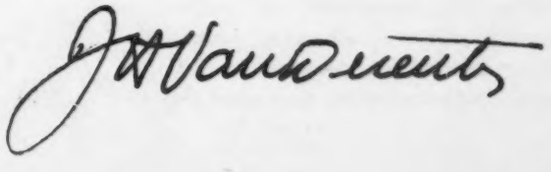
The other two freedoms are not so easy to deliver. Passing laws won't do it, nor will waving wands or taking rabbits out of hats.

Take, for example, the platitude of "freedom from want." What does it mean? "Want," in the dictionary has two meanings. One is to be without something and the other is to desire something. It makes a lot of difference which one you are aiming at.

Wanting things has made America the most prosperous country in the world. Wanting to make and sell more and better products has built our multitude of industrial plants and our even greater multitude of businesses. Wanting better working conditions and better wages has made American weekly earnings capable of purchasing nearly twice as much as those of any other nation.

Freedom from poverty is probably what was meant by freedom from want. But here again we have the indefinite rather than the specific which is so characteristic of the demagogic approach to the multitude. What may seem like poverty to you may be riches to me. And having less than you want or even less than you need has been the greatest spur to achievement and to personal betterment that has yet been applied to the human race.

The South Sea islanders are free from want. Nature supplies them with its bounties, the sun warms them, they need little in the way of clothes. They have a more ideal existence, with less effort, than the wildest dreams of our Washington idealists could offer, even with the help of unlimited national debt. But how much in the way of invention, improvement, literature or art have these wantless people given to the world?



Millions are "*Injured*" by a Single Accident

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Start today! Think safety, promote safety! Keep more workers on the job for Victory!

Enlist today in America's great crusade against accidents. For complete information write to the National Safety Council's War Production Fund to Conserve Manpower, Chrysler Building, New York City.

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Stress Cracking of Brass

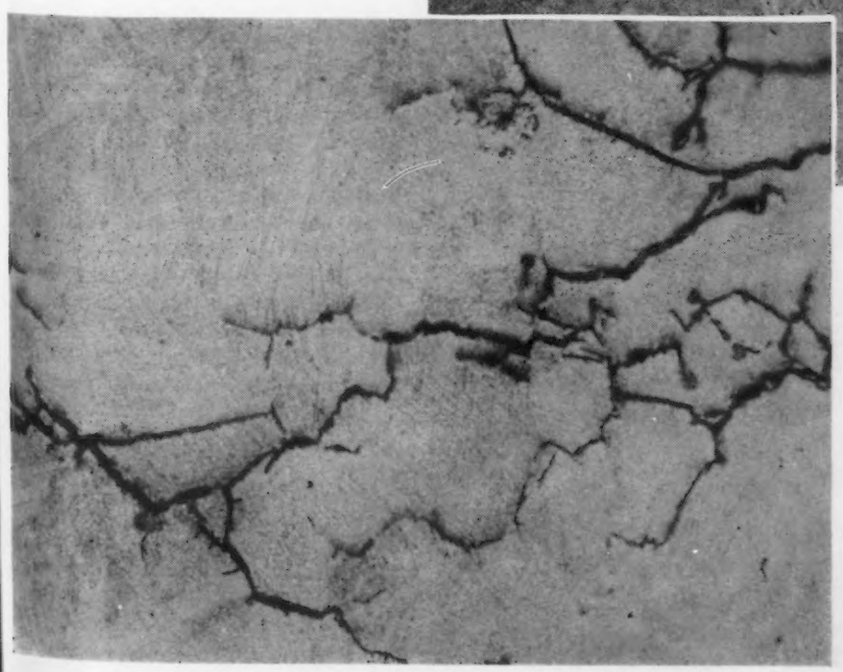
By MAJOR H. P. CROFT
and
G. SACHS
Department of Metallurgical Engineering, Case School of Applied Science, Cleveland

. . . Brasses or copper-zinc alloys of more than 50 per cent copper are liable to rupture under stresses much lower than their ultimate strengths. In this, the first of two articles, the authors discuss the nature of stress cracking, the ammonia and mercury tests, and the effect of external loads and of cold work.

IN general, structural alloys will at room temperatures withstand static loads close to their ultimate strength over extended periods of time; however, there exist exceptions to this rule, when metals rupture under stresses much lower than their ultimate strengths.

The time elapsing between application of the load and failure will be affected, to a certain extent, by external conditions, the presence of a corrosive fluid, or the presence of a liquid metal which has a solvent action on the other metal.

The brasses or copper-zinc alloys of more than 50 per cent copper are liable to both of these types of cracking. The danger of their corrosion cracking increases with the zinc content[16, 29, 73]. Under ordinary atmospheric conditions, a brass containing less than 80 per cent copper is considered susceptible to season cracking, i.e., fracturing in the presence of comparatively small external or residual (internal) stresses. The homogeneous, copper-rich, alpha brasses, the homogeneous beta brasses, containing approximately 50 per cent copper, and the heterogeneous, alpha-beta brasses with 55 to 62 per cent copper



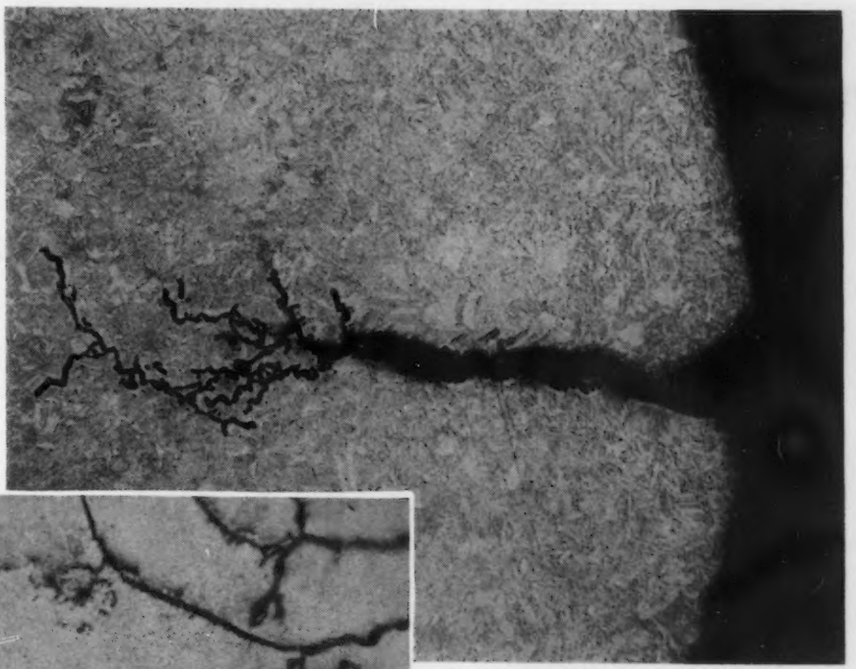


FIG. 1—Cross-sections of a 70:30 brass wire, cold drawn 60 per cent, which failed in mercurous nitrate under 65,000 lb. per sq. in. tension at 75 diameters (top), and 500 diameters (bottom).

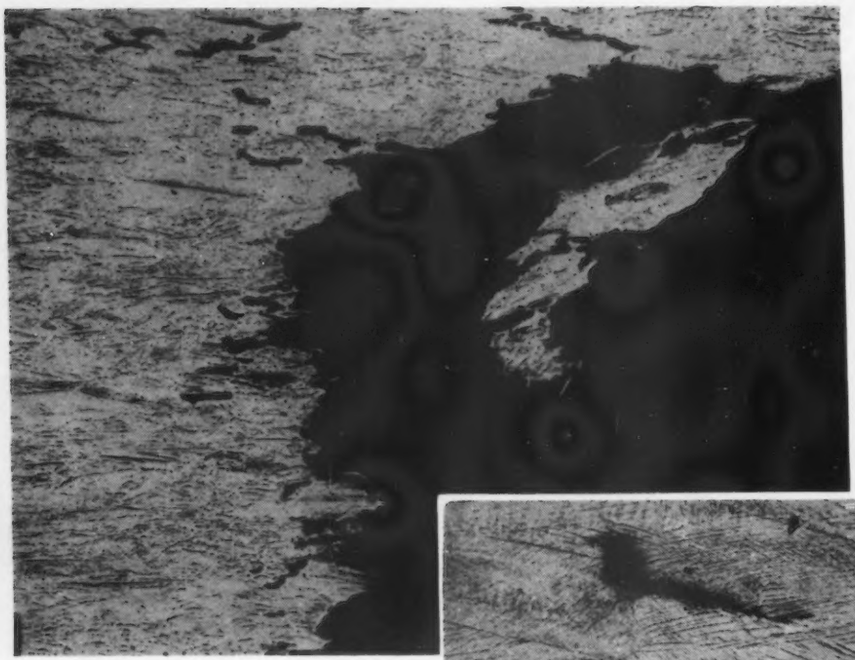


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FIG. 2—Longitudinal sections of the same wire shown in Fig. 1. Same magnifications top and bottom.

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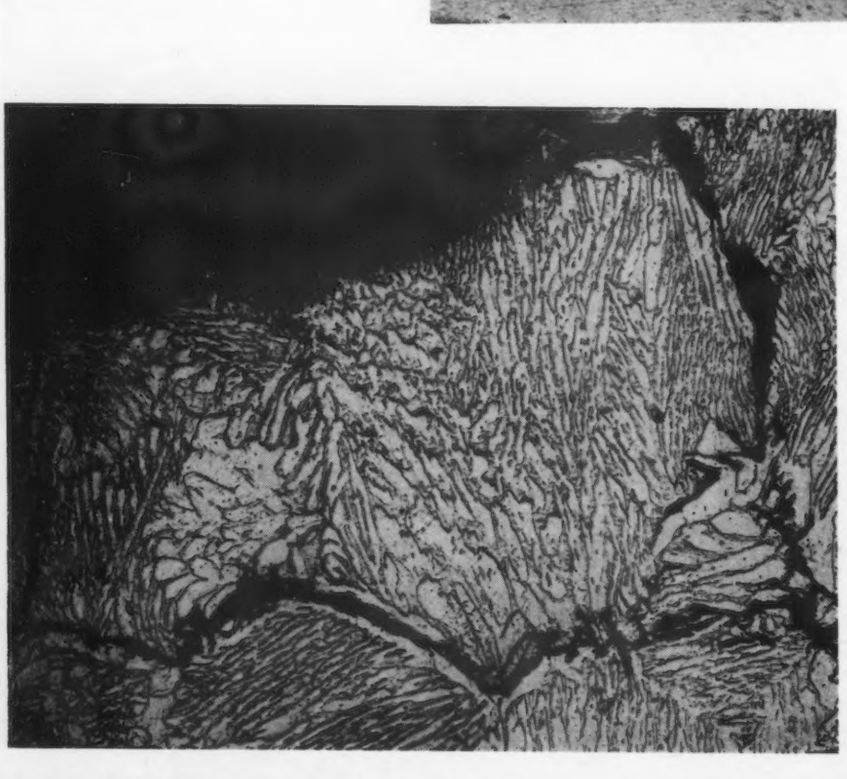
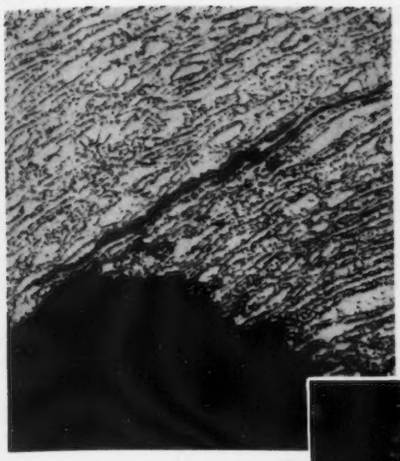
FIG. 3—Corrosion crack in a Naval brass bolt. At 100 diameters.



may develop season cracking under favorable conditions. The cracks have an intercrystalline nature in alpha brass (Figs. 1 and 2); while it has been reported that they pass through the beta crystals in alpha-beta brass[5, 85]. However, it appears more accurate to state that the path of a corrosion crack in alpha-beta brass is intercrystalline in relation to the primary beta crystals, from which the alpha crystals precipitated rather than from the beta-crystals, (Figs. 3 and 4). The cracking of pure beta brass (52 per cent copper), was found to be quite definitely of the intercrystalline type, (Fig. 5).

From the lightly corroded fractures caused by season cracking in a normal atmosphere, a slight amount of ammonia could be extracted[73]. Since this finding, ammonia has been considered the constituent of ordinary atmosphere which is responsible for the occurrence of season cracking. Brass, stored in a clean, dry atmosphere cracks only after a long time[5, 73]. The presence of water vapor and oxygen has been considered necessary to initiate cracking[74]. However, it has not been proved, so far, that corrosion cracking in brass does not occur if the atmosphere is free from any of these constituents. Other corrosive media which might produce corrosion cracking are: An atmosphere containing sulphur dioxide plus water vapor[54], aqueous solutions of ammonium nitrate[73], and storing while wet when the surface film contains over 0.1 per cent dilute sulphuric acid[42]. The statement that



ABOVE

FIG. 4—Corrosion crack in a cold worked section of a Naval brass bolt. At 100 diameters.

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RIGHT

FIG. 5—Mercurous nitrate crack in beta brass wire, extruded and 15 per cent drawn. At 25 diameters.

soap suds might cause corrosion cracking disagrees with commercial observations that neutral soap solutions retard rather than accelerate corrosion cracking[54].

Mercury Cracking

The cracking of brass subjected to stress and in contact with a liquid metal bears some relation to the effects of soldering and has been investigated from this angle. Molten tin and lead will cause brass to fail if sufficiently high stresses are present in the brass[26, 38, 45, 69].

However, more important than the phenomenon of cracking in contact with liquid solder is the cracking in brass subjected to the attack of mercury in the metallic state, or to mercury precipitated from mercury salt solutions in contact with brass. While this "mercury cracking" has no established relationship to the corrosion cracking, its mechanism is considered to be closely related to that of true corrosion cracking. The mercury test, therefore, is generally accepted as a suitable measure of the susceptibility of a brass article to cracking in the atmosphere.

However, a considerable minority rejects the mercury test, but considers an ammonia cracking test as the suitable criterion. There is a marked difference between the action of ammonia and that of mercury, in that ammonia penetrates the brass in the unstressed condition also, while the action of mercury is very superficial until cracks form along which the mercury penetrates[73]. It is probably the rather tedious procedure which has prevented the ammonia test from becoming a commercial test, while the mercury cracking test is recommended as a standard procedure.*

*American Society for Testing Materials, 1940.

Every observer has reported that the results of the mercury test scatter considerably[52, 89]. It has been generally recognized that the specimens for this test had to be carefully cleaned. The cracking time decreases slightly with increasing concentration of mercurous nitrate, while the rate of mercury deposition increases. Small variations in the concentration of the acid have little influence on the cracking time; therefore it is necessary to control the composition of the solution only within very close limits[73].

A factor which has considerable influence on the cracking time is the temperature of the mercurous nitrate solution[18]. The finding that the time of cracking decreases with temperature agrees with general conceptions about the effect of temperature on chemical reactions.

Many investigators have preferred a 1 per cent mercurous nitrate, 1 per cent nitric acid solution; however, a 10 per cent mercurous nitrate, 10 per cent nitric acid solution is considered standard in this country. While it is desirable to use such standardized methods, it has also been observed that the 10 per cent solution is not suitable for the visual detection of small, slowly forming cracks, which may be covered up by the excessive mercury precipitation[52, 96].

Samples exposed to liquid mercury in ordinary atmosphere possessed, according to the tests by the authors, a lower cracking tendency than identical samples subjected to the mercurous nitrate solution. However, samples tested in a nearly perfect vacuum by exposure to liquid mercury cracked much faster than when tested in normal atmosphere. Therefore, neither the presence of air nor moisture are necessary factors in the cracking of the brass. A surface layer apparently formed within a short time when the tests were conducted with the specimens exposed to the air and decelerated the reaction between the brass and the mercury. Such a surface layer either does not possess the protective effect or is continuously removed if the specimen is exposed to the mercurous nitrate solution.

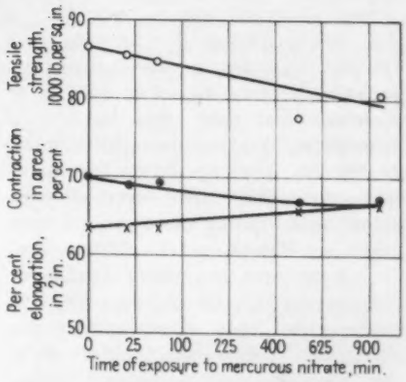

FIG. 6—Effect of exposure time at room temperature on mechanical properties of unstressed 70-30 brass at — 190 deg. C.

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Specimens subjected to mercurous nitrate at room temperature under

Values Observed for Cold Stretched 70:30 Brass Wire, 0.109 in. in Diameter, Grain Size 0.140 mm.

Stretching, Per Cent:	0	5	8.5	16	21	28.5
Applied stress, causing cracking within 15 min., in 1,000 lb. per sq. in.	22	25	27	28	29	31
Applied stress, causing cracking within 1 day, in 1,000 lb. per sq. in.	17	18	19	20	20	21

conditions which would either cause or not cause cracking after extended exposure, showed that an exchange of mutual diffusion of mercury and both copper and zinc had taken place. Freezing the mercury by cooling to the temperature of liquid nitrogen eliminated any intercrystalline cracking under external loads.

The diffusion of mercury and subsequent freezing produced effects which can be explained by alloying or amalgamation, such as a slight decrease in tensile strength and elongation, but an increase in ductility as measured by the contraction of area, (Fig. 6). These effects increased with the time at room temperature.

External Loads

The effect of quantitatively known stress produced by applied external loads has only lately received consideration. Cartridge brass (70 per cent Cu, 30 per cent Zn) strip in the annealed and rolled conditions will crack within 14 days in the mercury test if subjected to a tensile stress above 13,500 lb. per sq. in. but below 18,000 lb. per sq. in.[73]. On the contrary annealed cartridge brass rods were found to fail in an ammonia test only after 20 days if the applied tension was but 5,000 to 10,000 lb. per sq. in.[74], the exact time depending upon certain variables; and similar observations were made on Muntz metal (60 per cent Cu, 40 per cent Zn), and Naval brass (60 per cent Cu, 39 per cent Zn, 0.75 per cent Sn) rod. Above these limits of applied stresses the time of cracking decreases as the stress is increased.

The data obtained by the authors permit a more general evaluation of the relation between stress and cracking time in mercury cracking. Cartridge brass wire, and presumably any other high brass (64 to 75 per cent Cu) product, will crack in contact with mercury (metallic or deposited from salt solution) only if a tensile stress above a certain limit is simultaneously present at the surface exposed to the mercury attack. This holds true for annealed, cold-stretched, cold-drawn, and relief-annealed wire. Tensile stress may be externally applied or may be residual as retained from cold drawing, or a combination of both.

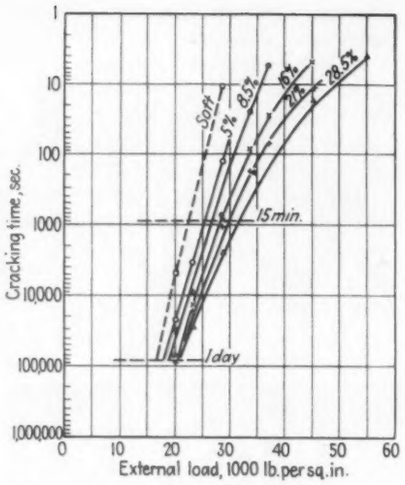

FIG. 7—Effect of external loads on cracking tendency in mercurous nitrate of cold stretched brass wire of various tempers. Diameter, 0.109 in.; previous grain size, 0.140 mm.

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By stretching annealed wire, brass can be strain-hardened without introducing residual stress. Consequently such wire will crack only if subjected to an external tensile stress above a certain limit (Fig. 7). The cracking tendency of cartridge brass decreases progressively as the amount of cold-work or strain-hardening increases, providing residual stress is absent; and the minimum applied stress which will cause cracking in mercurous nitrate solution increases with increasing cold-reduction. The accompanying table shows values observed for cold-stretched 70:30 brass wire, 0.109 in. in diameter, having a grain size of 0.140 mm. (Fig. 7).

These values are considerably higher than previously reported. This can be explained by the fact that the stress causing cracking in tests made by other investigators was not externally applied, but was present as residual stress, which is generally underestimated in the usual stress measurements. This underestimation has resulted from three factors: (a) The disregarding of radical stresses, (b) the partial release of stresses by the action of dissection used in the tongue and split-ring methods as well as the method of removing layers from the outside or inside of an article mechanically or by dissolving (the energy released by such methods probably being disseminated as heat), and (c) the disregarding of the stress relief effects resulting from localized heating in using the above methods.

The effect of cold work proper can be explained by the generally accepted conception that cold work causes a progressive fragmentation of the crystals. This process is frequently considered as equivalent to the transformation of the structure into one having a smaller grain size. This decrease of effective grain size by cold work indeed reduces the cracking tendency in a similar manner as does the reduction of the conventional grain size of the annealed condition.

Editors' Note: Next week, in concluding this investigation, the authors discuss residual stress and its dependency upon the type and magnitude of cold work, sum up the important general features of stress cracking and investigate theories of the phenomenon.

▼ ▼ ▼

Arc Welding Tool Steel

With Stainless Electrodes

By H. W. RUSHMER
Jeffrey Mfg. Co., Columbus, Ohio

. . . Conservation of high carbon and high speed steel can be achieved by arc welding composite tools, using stainless steel electrodes. If the proper procedure is used, there is no grain growth of the high speed steel due to the high arc temperature. This paper was one of the entries in the recent $200,000 award program of the James F. Lincoln Arc Welding Foundation which indicated annual cost savings of almost $2 billion due to arc welding.

TUNGSTEN, one of our most important strategic materials, is a heavy constituent of high-speed steel, and it behooves us to conserve what we already have in our plants. If this can be done, it will be a real contribution to our full war effort. As it is imperative to conserve our present supply, arc welding is offered as a means to this accomplishment. By taking advantage of this process, great savings in dollars and cents as well as in time can be accomplished by making use of material which formerly found its way to the scrap barrel. Even small pieces can be used economically as tips on tool steel shanks.

Many attempts have been made to weld tool steel (especially the high alloy steels) with either coated or uncoated low carbon steel electrodes, but they have been unsuccessful. It has been amply demonstrated, however, that all tool steel, including high speed steel can be successfully welded by using the 18-8 stainless steel electrodes.

Figs. 1 to 4 show sample test bars made by arc welding carbon tool steel to 18-4-1 high speed steel. The samples were preheated with the acetylene torch, then arc welded with 18-8 stainless steel electrodes. It is better, however, to heat the parts to be welded in a furnace, as the heating is slower and more uniform. The sample was heated to the proper forging temperature and forged in the center to ½ by 1 in., leaving the ends the original size (⅝ x 1¼ in.), as shown in Fig. 1.

Fig. 2 illustrates this same sample bent to a U shape, or an angle of 152 deg. Previous to this bending test, the test bar was heated to the forging temperature and bent in the weld to an angle of 90 deg. then straightened out flat again, and then by reversing the sides it was bent as shown in the photograph. On this last bending test there were no signs of the weld coming apart.

Fig. 3 shows a weld similar to that in Fig. 1. The stock used was ⅝ x 1¼ in. One piece was carbon tool steel, the other piece was 18-4-1 high speed steel, welded with 18-8 stainless steel electrode, 3/32 in. in diameter. After the welding operation, the test piece was forged to a smaller size, ½ x 1 in., without any signs of failure in the weld. At the right in Fig. 3 is shown this same specimen after a tortional test. It was twisted 180 deg. without any signs of rupturing the weld.

It is well not to spread the weld over too great an area, as a short weld is equal in strength to a long one; besides, it conserves our limited supply of stainless steel. The reason why the welds cover such a large area as shown in the photograph is due to the stretching of the steel during the forging operation.

In another test bar two pieces of 18-4-1 high speed steel were welded with 18-8 stainless. In the torsional test there appeared three small ruptures on two sides of the stainless steel zone. These small ruptures were about 1/64 in. wide and the same in depth. After the polishing and buffing operations they had entirely disappeared. Very little work has been done up to date on welding two pieces of high speed steel together, but from present tests it looks quite encouraging for the arc welding process. A few broken high speed steel tools have been welded in an emergency and are still giving good service.

In a few instances there were

FIG. 1—Two views of a test bar welded with stainless steel. Upper half is high speed steel; lower half, carbon tool steel. This piece was forged down after welding.

FIG. 2 — U-bend test on welded sample shown in Fig. 1. The weld area may be plainly seen in the middle.

failures of composite tools in the welds and the writer assumed that the apparent brittleness was due to the formation of new carbides as a result of the high temperature of the weld. The temperature of the arc is estimated at 7000 deg. F. To get the best results from 18-4-1 high speed steel the temperature should not be elevated much above 2350 deg. F. Above this temperature grain growth develops rapidly.

To study this effect, two pieces of ¼ x 1 in. SAE 1095 steel were welded to a piece of 18-4-1 high speed steel. One weld was made with 18-8 stainless steel electrode; the other piece was welded with phosphor bronze electrodes. Three samples were cut from this bar, one from the stainless steel weld, one from the phosphor bronze weld and the third from the center of the bar which was not heated. It is evident in Fig. 4 from comparing the microstructures adjacent to the weld with the unaffected high speed steel that there is little or no grain growth as might be suspected. It will require further study to determine just what caused the failures and provide a remedy.

It is a difficult operation to attempt to machine composite tools after welding, but if the tools are heated to 1500 deg. F. quenched in oil, then are annealed according to the standard practice for high speed steel, no difficulty will be experienced. Also, it has been noted that if this treatment is applied to tools with thin sections a gain of strength and less breakage result.

Many tools can be welded without machining the surfaces. Either forging or rough grinding is perfectly satisfactory. Of course, a better bond is effected by removal of the scale.

Phosphor bronze electrodes can be used to good advantage on some tools. The cost of phosphor bronze is less than stainless steel. Tools made from high speed steel must be forged and hardened before welding with phosphor bronze. Carbon tool steel, on the other hand, can be welded either before or after the welding.

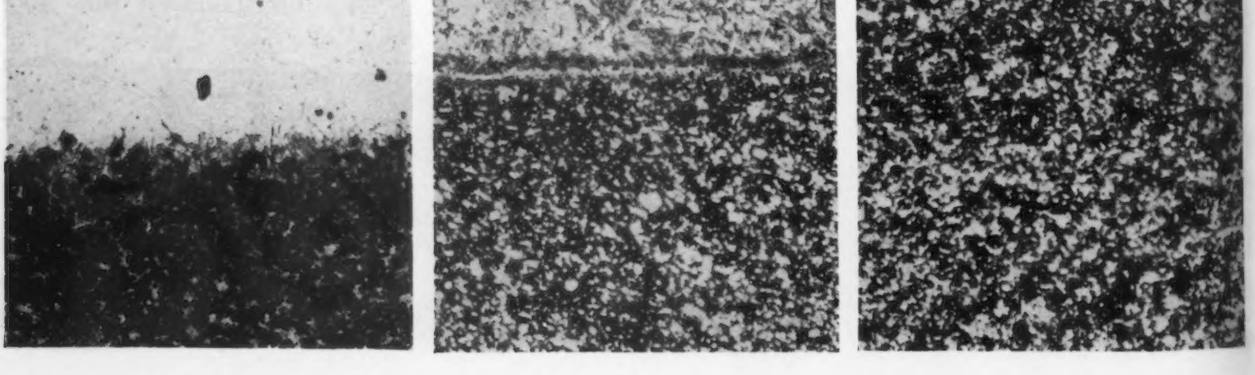
Application to Lathe Centers

The demand for better lathe production requires greater feeds and speeds. thus making the carbon tool steel centers unsatisfactory. High speed steel can be used as a substitute. The old carbon steel centers can be salvaged by annealing, then machining as shown in Fig. 5. The composite center is then welded around the groove. Even high speed steel centers that have become too short, can be annealed, and a new center welded on, as illustrated in sketch. After welding has been completed it is important to anneal the piece to relieve the welding stresses.

FIG. 3—Before and after a twisting test on another welded test bar. Upper half is SAE 1095; lower half, high speed steel.

In Fig. 6 is shown a countersink using the shank of an old drill. The sketch amply illustrates the procedure to follow. The cost of high speed steel for this blade was less than $1. The cost of material, if made entirely from high speed steel would have been $6. In addition the forging and machine costs would be three times

FIG. 4—Microphotographs (250 diameters) of sections of test bars. (A) Junction of stainless steel deposited metal (upper) and high speed steel. (B) Junction of phosphor bronze weld metal (upper) and high speed steel. (C) High speed steel structure out of weld heat affected zone.



the cost for the high speed steel. Made as shown, material and labor cost would not exceed $3.

In Fig. 7 is shown the method used in welding an extension on a tap. The stock used for making these extensions can be drill rod or even low carbon machine steel. This method has been used on countless numbers of taps, drills, and reamers. Machine steel for extending the length of drill usually is satisfactory. Even pipe taps with short shanks are welded and give good performance. In welding taps it is well to cover the threads with asbestos or a thin piece of sheet metal. This precaution is due to the sputtering of the arc which may cause small globules of hot metal to deposit on the threads.

In Fig. 8 is shown a high speed steel broach which had broken at the eye. About 4 in. back of the eye it was cut off by grinding, the temper was drawn and the stub end ground to a point. A piece of ¾ in. drill rod was ground to a point and welded to the broach as shown. When the machine work was finished, the eye was given a spring temper. It is conceded that carbon tool steel properly tempered will withstand greater pulling stresses than high speed steel. Hence the broach was stronger in the eye than when new.

Conventional square tool bits are fairly satisfactory for light cutting, but when working against time and heavy cutting they fail due to the springing, shattering and the absence of body to the tool to carry away the heat so rapidly generated at the cutting edge. Fig. 9 shows a tipped tool designed partly to overcome this absence of body to carry away the heat, during heavy, hogging cutting. If the contacting surfaces are perfectly flat little welding will be required. To prevent drawing the hardness do not leave the arc on too long in one place and do not use electrodes larger than 3/32 in.

Fig. 10 shows a roughing tool for lathe, shaper or planer. Several other designs have been used to conserve high speed steel, but the design shown worked out as being the most practical. These high speed steel points can be forged in a swage, annealed, then cut to desired length in a power hack saw. Old tools that have become too short for further service can be forged to meet these requirements. After the welding has been completed they are heated and ground to shape while hot. It is con-

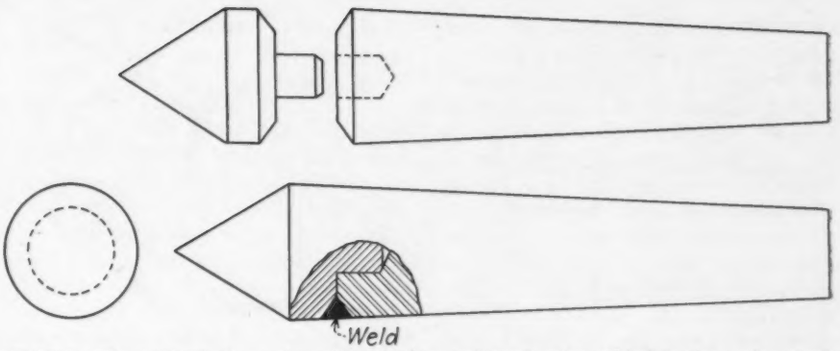


FIG. 5—Composite lathe center with a high speed steel point welded to the carbon tool steel shank.

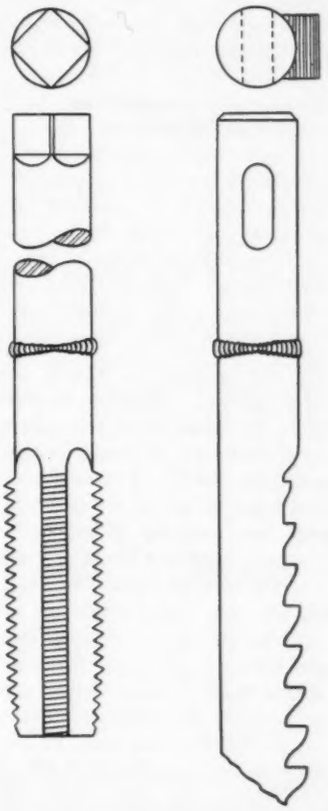


FIG. 7—(Left) Taps fractured in the shank can be reclaimed by welding on an extension. Fig. 8 (Right) Broach reclaimed by welding on a new eye.

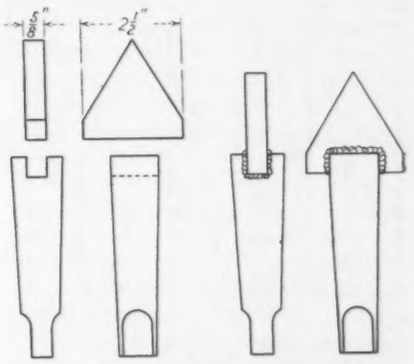


FIG. 6—Countersinking tool made by welding a high speed steel tip on an old drill shank.

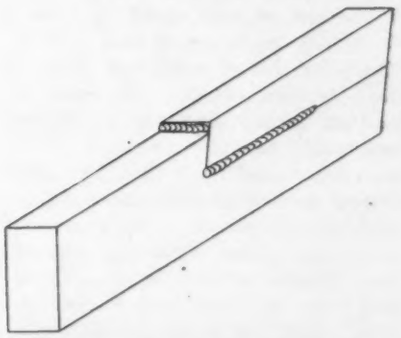


FIG. 9—This design was made largely to provide larger heat dissipating capacity than available in the square tool bit itself. If the contacting surfaces are perfectly flat, little welding is required to hold the high speed steel tip on the shank.

o o o

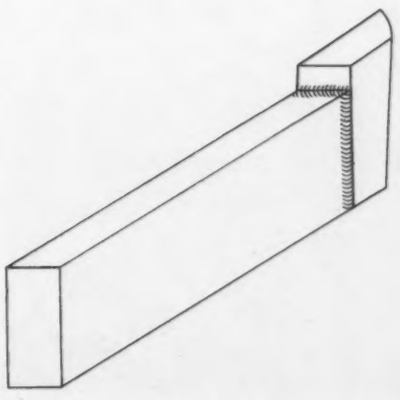
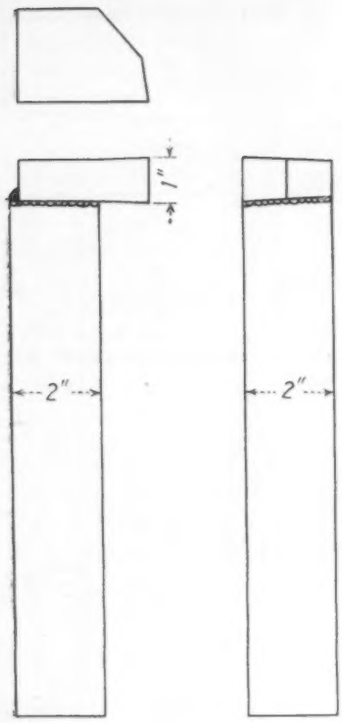


FIG. 10—This type of tipped roughing tool for lathe or planer proved very practical.

o o o



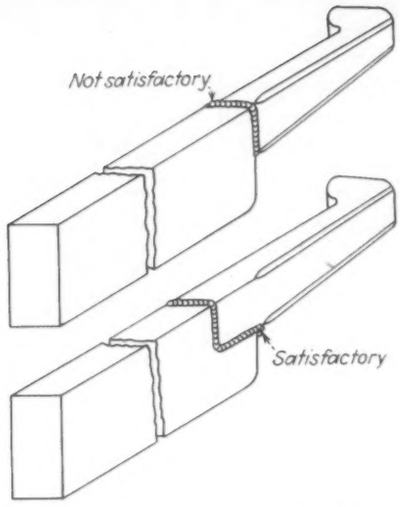


FIG. 12—Two types of inside threading or boring tools.

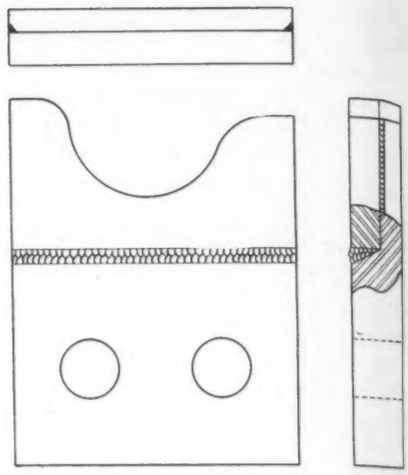


FIG. 13—A tipped forming tool used in a planer.

o o o

LEFT

FIG. 11—Heavy side cutting tool for a planer.

sidered good practice to give all welded and forged tools a good annealing after these operations.

The cost of high speed steel for a ¾ by 1½ in. roughing tool is $3.45. The labor cost of smith and helper is 80c., totaling $4.85. The cost of medium carbon steel for the welded tool would be 12c. The cost of the high speed steel tip is 16c. The labor cost of the welder, 25c., making a total of 53c. A saving of $3.72 per tool of the above size. Overhead has not been included in these figures. In the past many of these short pieces have found their way to the scrap barrel.

In Fig. 11 is shown a heavy side tool for a planer. Four tools were ordered to be made of 2 in. square, high speed steel, which would cost for the steel alone $61.47. In addition to this $2.48 must be added for the forging operation, totaling $63.95. The cost of medium carbon steel for the shanks of the welded tools was $1.91. The cost of high speed steel for the points was $6.14, and the cost of forging these points to prepare them for welding was $1.25. Labor cost of arc welding the tools was $1.20, making a total cost of $10.50. Arc welding has made it possible to save $53.49 on these four tools. Four other tools, designed like Fig. 11, when made with shanks of SAE 1045, effected a saving of $23.63.

In Fig. 12 is shown two designs of an inside threading and boring tool. In a few instances the upper tool failed in the weld, but when made as shown in the lower view no failure occurred.

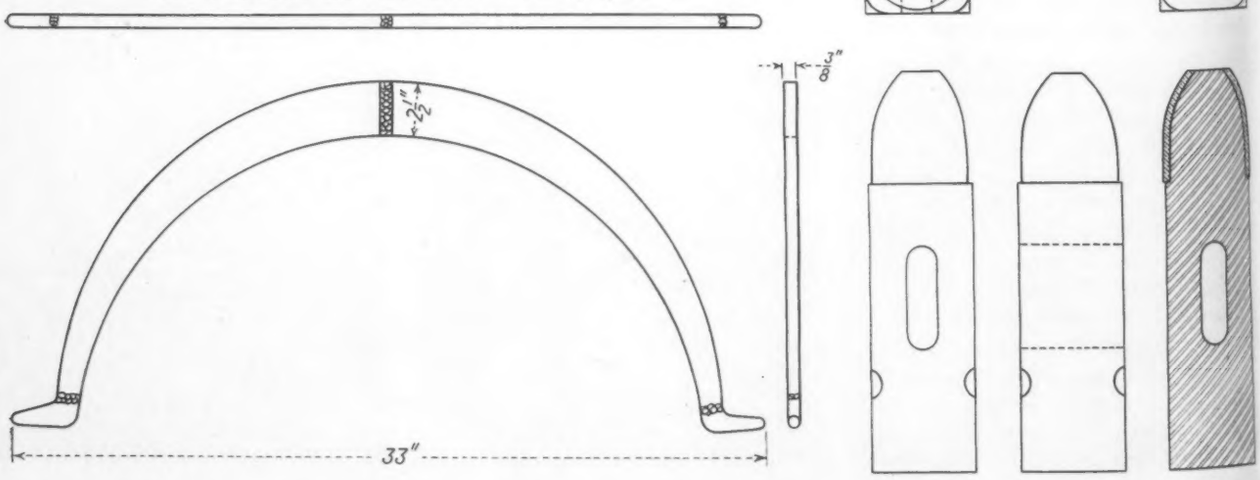
In Fig. 13 is shown a radii forming tool for a planer. A complementary convex tool was also made in a similar way. They are clamped in a tool post that is used for scores of finishing tools with various con-

RIGHT

FIG. 14—Because of lack of material, this big gage was made of SAE 1045 steel tipped with carbon tool steel.

BELOW

FIG. 15—A set hammer banded with stainless steel prevents chipping of the head. The head is hardened and drawn after the welding operation.



tours and radii. It requires four tools for the set. The cost of high speed steel for these would have been $15.70. The cost of SAE 1045 steel was 50c.; cost of high speed steel tips, $3.40. Extra labor in machining to prepare for the high speed steel tips was $3. The cost of welding the plates to the body of the forming tools was $2, totaling $8.40, making a total saving of $7.30. The main factor that prompted the use of the arc welding method was the discovery that no stock was available for the tools. To order the stock from the mill would have delayed the order three or four weeks. By using the method shown, the tools were made immediately, and the order was shipped in record time, which is an all important factor during this war emergency.

In Fig. 14 is shown a snap gage of unusual size. The material specified was carbon tool steel, but since this was not available, the gage was finally made from SAE 1045, with carbon tool steel tips arc welded as illustrated. To make it easier to forge, the gage was made in two pieces and arc welded in the center. Only the two small points were required to be hardened and ground. There was a saving of $2 in labor and material, but again the main factor was a race gainst time.

In Fig. 15 is shown a toolsmith set hammer with a head banded with stainless steel. When these set hammers are left soft on the head they are soon mushroomed, and if hardened they are liable to chip and injure some one, so arc welding a band of stainless steel was resorted to for longer life and safety. In preparing for the weld, the head of the set hammer is forged down a trifle. After the welding is completed, the hammer is hardened on the head end and drawn at 750 deg. F. Be careful not to weld the tip end of the hammer for this is what should be hard. For lighter work, a band of phosphor bronze may give satisfactory service.

Stainless steel being austenitic will not harden. Also it is non-carburizing. Both these characteristics are used to good advantage in certain parts of machine construction. On case hardened work the area that has to be welded after hardening is coated with stainless steel before carburizing. Then after carburizing and hardening welding can be safely done on the protected, non-carburized area. Occasionally there is a place where there is more or less impact on a piece of high speed steel. By arc welding a thin band of phosphor bronze on the part it will function remarkably well.

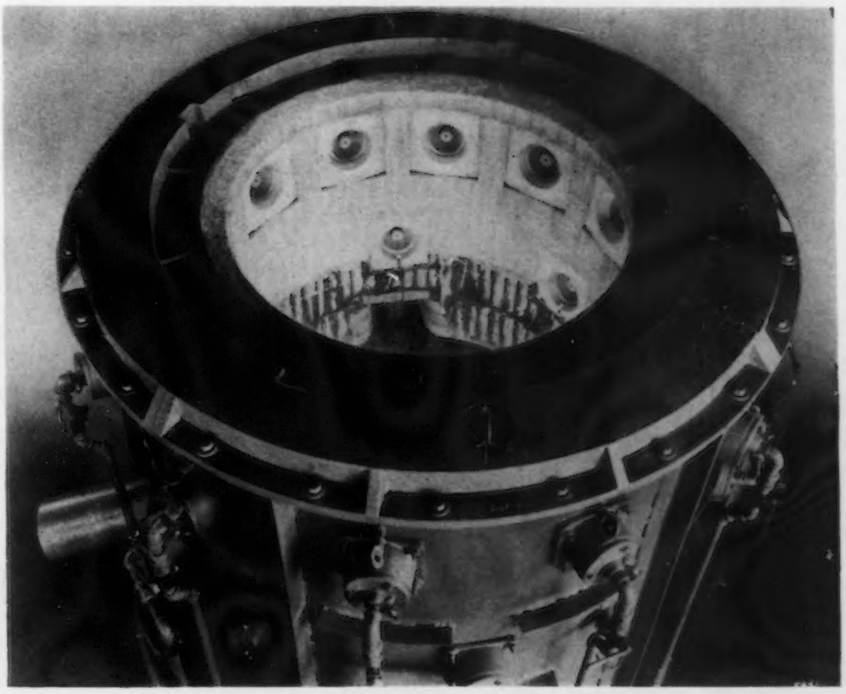
It is a difficult task to give the cost data of welding these composite tools due to the fact that there are so many designs and sizes which affect the cost of each tool. But it is perfectly patent, especially to the tool engineer, that when a material costing from 3 to 5c. per lb. is substituted for a material costing from 65 to 80c., there must be a large saving. The cost of welding these tools is a trifle more or less than the forged tool. Moreover, welding is easier and much more pleasant work than the smithing operation.

In welding these tool steels, clean and careful workmanship is required. The welder must be careful to avoid slag inclusions if good results are expected. It may impress some that it requires exceptional skill to produce a good weld, but the welding operation shown in Figs. 1 to 4 was the work of a man having 7 months' experience.

Radiant Heat for Magnesium Melting

TO foster greater uniformity of heat delivery over the sides and bottoms of magnesium melting pots, the Selas Co., Philadelphia, has adapted the ceramic-cup radiant gas burner to the firing of furnaces especially designed for magnesium metal production. The photograph shows the largest of 15 units recently built.

Eighteen Type-K-670 all-ceramic radiant-cup gas burners are employed —12 in the top row, 6 in the bottom row—around the circular pot setting. Gas and air, premixed in correct ratio, is delivered at 12 to 15 in. of water manifold pressure to each burner through an individual line and manual valve. Once the balancing valves are set, single-valve two-point control, actuated by a thermocouple in the molten metal, operates to throttle or open the manifold mixture supply to all burners at once and automatically maintain a pouring temperature of 1350 deg. F. in the pot at all times. An auxiliary thermocouple in the combustion chamber is connected into the control system so that a maximum outside pot temperature determined by the user can never be exceeded. Thus the maximum temperature gradient through the pot walls can be limited. In operation, each refractory burner cup attains uniform high incandescence and completes the air-gas combustion reaction entirely within the cup concavity.



Production Short Cuts

LEFT

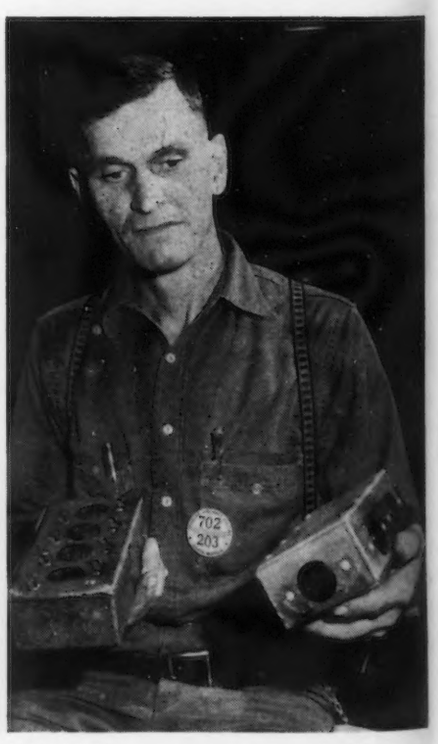
. . . Kirksite has been substituted by Douglas, at the suggestion of A. E. Nelson, for flash electrode dies, with an insert or lining piece of copper substituting for the solid copper formerly used. However, kirksite dies often have indentations and holes created when the molten metal cools. To weld and reface a level surface is necessary. The device shown above, suggested by B. W. Vinsonhaler, allows any angular face of the die to be raised or lowered to a level position. Raising and lowering is done by an overhead crane which hooks into the rings at the top of the leveling device.

RIGHT

. . . A quick change boring bar, devised by Victor Sundquist, saves 61.6 hr. lathe time on each C-54 transport. Cutting tools are inserted into the bar, shown in Sundquist's right hand; all types and sizes of cutters can be placed with the two set screws. The machinist then needs to make but one setup for the various diameters of cuts which are made in a unit, such as the aluminum hydraulic booster valve shown beneath Sundquist's right hand. Boring, threading and finishing are all done with one setup. The same principle can be used on external cuts and precision lathe work.

LEFT

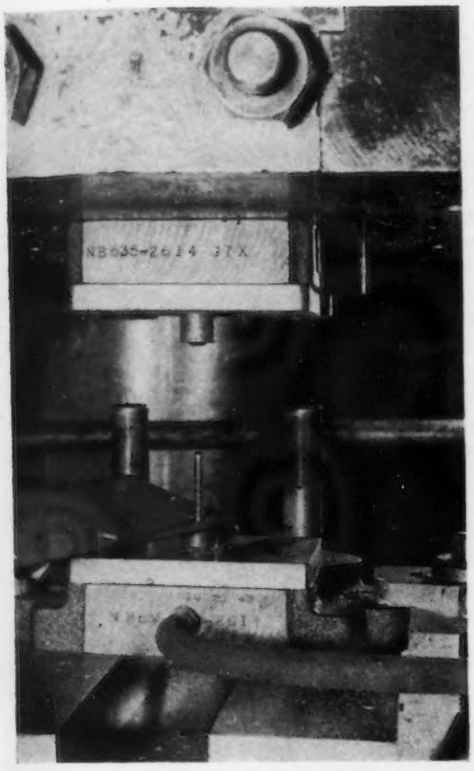
. . . Six hours a plane are saved with C. Davis's inner wing electric wire loom jigs. The wire layouts to be installed later on the plane are laid out and tested in one operation, then removed from the loom jig and installed.



RIGHT

. . . An outlet on the side instead of the top of an electric junction box keeps dirt out of the twistlock receptacle. This idea of Burt Smith's has obviated short outs, and has reduced repairs from 50 boxes a week to five.

. . . suggested by employees, save Douglas Aircraft Co. hours of man and machine time on each plane.



RIGHT

. . . A portable pneumatic notching tool attachment enables one man to do work which formerly took two, and save 21.4 hr. on each C-54 transport. Previously, airplane skins were placed on the jig, marked for notching, and then removed for the actual notching. This attachment, suggested by V. K. Kennedy, makes it possible to notch the skin on the jig.

LEFT

. . . With this combination broach, burnisher and dimpling tool, devised by R. C. Wood, scoring and tearing of metal is prevented. The previous method made a rough edged hole which tended to crack the stock when the dimpling operation was performed separately. Now the hold is broached, burnished and dimpled in one punch press operation.

RIGHT

. . . This striping machine, invented by Walter A. McGarvin, saves 3½ hr., 160 ft. of tape and $8.26 on the 140 ft. of striping for each plane. The striper barrel holds a half pint of lacquer, poured in through a cap. At the lower end, a small hole permits lacquer to flow into a groove around the periphery of a brass roller 1 in. in diameter, which turns on a pin supported by frame fitted over end of barrel. A cross member of the frame serves as a spreader, conducting lacquer from the groove toward both sides. An adjustable guide arm enables the operator to follow chalk marks.

LEFT

. . . With this new "C" flange jig, suggested by Jack Doyle and W. J. Griffis, 180 parts can be completed in an hr., against 16 an hr. on a hydraulic press. Master block and two inserts make both right and left.

Determining Open Hearth

DESPITE the fact that much of the early success of the spectrograph occurred in the ferrous industry, subsequent plant application of such equipment has been relatively slow. However, in contrast to this, whole sections of the nonferrous field employ the spectrograph almost exclusively. To a considerable extent this favorable attitude toward spectrographic analytical methods in the non-ferrous work results from the relative shortness of time involved in melting and refining practices and the difficulties encountered in chemical analysis. It is, however, quite probable that the inherent accuracy and speed of operation of the spectrograph, combined with its recently developed dependability and low operational cost, will also serve to bring about its greater adaptation to the ferrous metal field.

Spectrographic history in the steel industry has been one of tentative trials. Several foundries have made very expensive and excellent installations, but other foundries have been slow to follow up their experience. Several steel mills and secondary producers have made installations for quality control of semi-finished shapes and sheets. Raw product control, a vast field, has only slightly been touched, although with unusual success. Claim work, also qualitative in nature, has employed the services of the spectrographer from time to time. For example, the failure of some deep drawing sheets was traced to brittleness resulting from a very low contamination of zinc.

There is one field, however, that offers unusual promise for spectrographic control. In the open hearth, a preliminary analysis for residuals is made of the bath immediately after the melt down. The residuals may include copper, nickel, tin, chromium, silicon, molybdenum, aluminum, and manganese. The need for rapid but accurate analysis is becoming more and more apparent not only for the familiar reasons, calculation for alloy additions, diversion of heats, etc., but also because of the grave scrap supply situation existing at present.

Studies by J. D. Sullivan of Battelle Memorial Institute and others have emphasized the increasing residual content in open hearth steels during the past decade; but the war, in provoking scrap shortages, erratic scrap sorting, and tin scrap charging, has placed a question mark beside the residual content of every heat of steel.

For the chemist, the determination of residuals, at best difficult and sometimes tedious, now becomes increasingly more difficult. Normal facilities are inadequate, competent personnel not readily accessible, and sufficient time for accurate sampling and analyses often not available. For these the chemist has had to resort to additional methods other than the normal "wet techniques." It is here that the spectrographer and the steelmaker are commencing to work side by side.

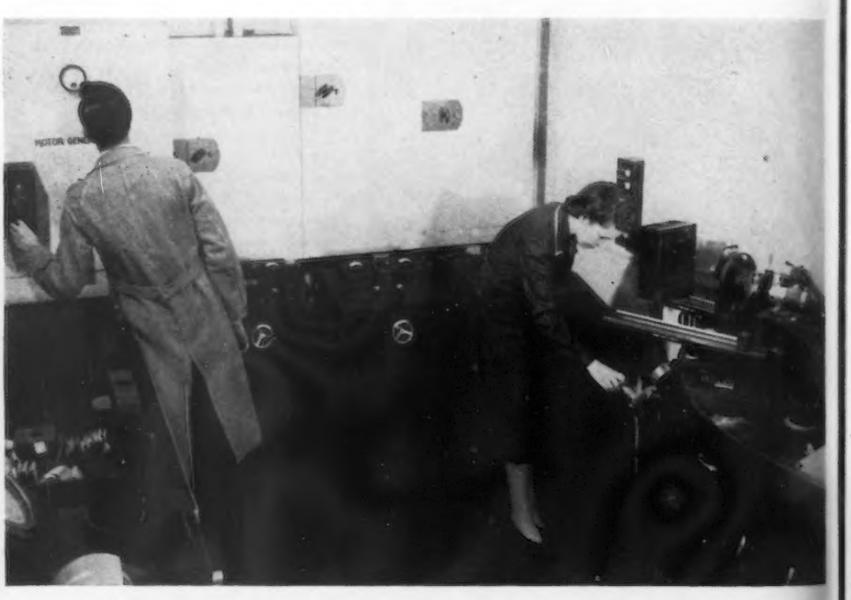


FIG. 1—A portion of the spectrographic unit can be seen at the extreme right. In the background are (1 to 4) the d.c. arc, a.c. arc, and a.c. spark power units. The motor generator set, which supplies constant voltage, is located beneath the table at the extreme left, with controls brought out on panel above table level.

Spectrographic Laboratory

It should be recognized that the spectrograph has applications other than those associated with war production and the conservation of strategic alloys. The post-war period will probably be one of a highly competitive market with even closer tolerances and finer distinctions than now prevail. The spectrographic method of analysis is admirably fitted to fill these requirements.

In addition to those already mentioned, numerous other elements such as titanium, arsenic, antimony, zinc, cadmium, bismuth, boron, beryllium, zirconium, cobalt, columbium, and tungsten can be adapted to quantitative spectrographic techniques. There is, in fact, another large field for spectrographic analysis, particularly for these elements, since the wet methods are usually long and difficult. Cobalt, for example, requires a day and a half for analysis. Spectrographically, it is possible to determine cobalt content in less than one hour. The principal elements in steel which cannot now be determined quantitatively by the spectrograph are carbon, phosphorus, sulphur, oxygen, hydrogen, nitrogen, permanent gases, and halogens. Qualitatively, about 70 elements in all can be checked by the spectrograph.

The desirable location for the spectrographic laboratory is as near as

Residuals *By Routine Spectrographic Analysis*

. . . The steel plant spectrographic laboratory and how to utilize spectrographic analytical methods for quantitative as well as qualitative determinations of residual contents in open hearth charges are described in this article.

o o o

By J. T. ROZSA

Spectro Analyst, Republic Steel Corp., Cleveland

o o o

possible to the furnace which the spectrograph is to control. A building immediately adjacent to the floor of an open hearth is often preferable to having the laboratory on the open hearth floor itself. For electric furnaces, the spectrograph may be placed on the floor. In general, three conditions will determine the laboratory site:

Vibration: The usual types of vibration may be overcome by mounting the spectrograph and densitometer on steel plates and suspending them from the ceilings with springs. Rubber snubbers are used to minimize lateral movement. The pulsating type of vibration is almost impossible to overcome. For severe cases, adjacent buildings having little vibration will be found to be the best solution.

Dirt, Fumes, Smoke, and Heat: For mill locations, complete air conditioning is mandatory to insure accurate results and low maintenance costs.

Electricity: Stray electricity, particularly of a high frequency nature, can be minimized by grounding all apparatus and cabinets, by using metal darkroom partitions, and by employing transformer chokes.

Apparatus selection is almost entirely dependent upon the application although initial applications nearly always can be depended upon to increase in scope with continued use. In the case of the spectrograph itself, for various reasons the use of concave gratings has been the subject of much misinformation. It is not uncommon to pick up an article on the spectrograph, written five or six years ago, and read the flat declaration that concave grating spectrographs can never be adapted to quantitative work. However, it should also be remembered that 30 years ago some of the leading spectroscopic authorities were in agreement that quantitative analysis by the spectrograph was not possible at all.

FIG. 2—A master spectrum is incorporated in this projection-comparator type of densitometer. The operator is shown pressing the button which flashes the spectrum lines on the screen immediately before her eyes. By measuring the density of light passing through these spectrum lines the content of an element in the sample of steel under test is determined.

As is often the case with anything new, the label of "radical" or "untried" is often attached. Even a cursory survey of spectrographic literature of the past two years will show the error of such a statement.

While often deemed fragile, instances of gratings being in use since 1880 are known. Precision ruling has been enhanced to reduce ghost lines to negligible proportions, and evaporation of aluminum films upon the surface of the grating has made them faster and still less fragile.

The inability of the grating spectrograph to produce stigmatic images has long been emphasized as a severe fault, but today is being answered by such mountings as the Wadsworth and by the use of the secondary focus, as in Sirk's method.

Analysis Efficiency

From the basis of spectrographic efficiency, dispersion and resolving power are important. Dispersion may be defined as the ratio of the change in the deviation of the light beam to the change in the wave length. Resolution is the ratio between the aver-

TABLE I

Dispersion and Resolution Characteristics of 1.5 Meter Gratings and the Quartz Littrow

Wave Length, Å	DISPERSION		RESOLUTION	
	1.5 Meter Grating Å per mm.	Quartz Littrow Å per mm.	1.5 Meter Grating Å	Quartz Littrow Å
2500	7	2.5	0.12	0.07
2850	7	4	0.12	0.12
3500	7	7	0.13	0.25
4700	7	16.5	0.15	0.75

age wave length of a pair of lines that can just be separated and the difference in wave length between these two lines. Especially for steel analysis, high resolution is the primary criterion since it is needed to permit separation of lines sufficiently for identification and an estimate of the amounts of elements present. In disperson and resolution, the usual Littrow, as indicated in Table I, has little, if any, advantage.

In fact, the constancy of dispersion without magnification or crowding near the visible range as occurs for the quartz Littrow is a distinct advantage for the grating type. The table for resolution, however, is the deciding factor. Since for steel preliminary analysis work, the spectrum lines of copper, nickel, tin, chromium, molybdenum, silicon, and manganese lie within the 2800 to 3400 Å range, the superiority of the grating type is indicated.

When the quartz Littrow type spectrograph was first adapted to production control, $12,000 for equipment, $25,000 to $40,000 for development to a particular application, and a development period of six months to two years were not deemed unusual. These costs and this length of time were necessary because the spectrographic unit had to be custom-tailored. Today, the situation has changed appreciably. Completed "packaged" units employing grating dispersion are now available. These units with attendant mated equipment are designed with the ruggedness, flexibility, and convenience of maintenance needed for routine production without sacrifice of accuracy. It is possible without too many difficulties to obtain the desired characteristics by combining units from various companies. For gratings mounted on the Rowland circle method, a long range, 2000 Å to 10,000 Å can be obtained for qualitative work without disturbing the routine range settings, optics, or focus as is required in the quartz glass Littrow type.

Reasons such as these are making the grating unit the most widely used spectrographic instrument in this country. Those persons fortunate enough to have had the opportunity to use both the quartz and grating spectrograph for steel analysis have registered a distinct preference for the grating type.

In general, two excitation sources are needed. A condensed spark consisting of synchronous interrupter, condensers, variable inductance, and safety controls will usually suffice for work where the metal constituent is above 0.10 per cent. Several of these units are now commercially available, being rugged, controllable, and adaptable to the severity of industrial handling. The second excitation source, an a.c. arc, will suffice for general qualitative work and for quantitative work where the metal constituents are below 0.10 per cent. For routine work, it is preferable to obtain one of the loading jig varieties of arc-spark stand in preference to the usual De Gramont type.

Constant voltage is needed for the excitation sources and the densitometer. Even if the mill is adjacent to a power plant, a motor-generator source will nearly always be needed. A planned layout in actual use, incorporating these features, is shown in Fig. 1.

Reproducible film processing for many years has been a discouraging factor in quantitative work. Now, however, suitable automatic developing equipment, washers, and dryers are commercially available, and these, combined with fairly recently developed film emulsions, have simplified this phase of spectrographic work.

Densitometers also have improved appreciably within the last few years. It is advisable, however, to specify the projection-comparator type which incorporates a master spectrum. Ruggedness, speed, and repairability are also needed for production work. Such a projection-comparator is shown in Fig. 2.

Considerable room for improvement is still present in commercially available calculating boards. Greater convenience and speed is obtained if the board is set at an angle of 60 deg. from the horizontal. Drawing up scales for rapid direct calculation also presents difficulties.

TABLE II

Accuracy of Routine Analysis of Open Hearth Melts by Spectrographic Determination

Element	Range in Melt, Per Cent	Accuracy of Analysis, Per Cent
	under	within
Tin	0.05	0.005
Nickel	0.20	0.005
Copper	0.30	0.008
Molybdenum	0.05	0.005
Chromium	0.07	0.008

Preparation of Samples

If a simple holder is used for initial roughing down, and if the specimen is held in the fingers for the final polishing, a 5/32-in. diameter pin can be prepared in about 20 sec. Grinding jigs, in general, are time consuming and not completely satisfactory. Additional equipment in the laboratory should include a strong vise, hacksaw, hammer, a substantial table, grinding wheel, and the common repair tools. Sooner or later the spectrographer usually finds himself serving as repair and maintenance man for all his equipment!

As previously stated, conditions have changed considerably since the early installations and it is now possible to equip and develop a routine laboratory with a total expenditure in the neighborhood of $12,000. At one large steel company where a grating spectrograph is used for residual analyses, the chief chemist recently asserted that within nine months the equipment had paid for itself in qualitative and quantitative analyses without even considering the timed saved in such analyses.

Once the location is determined, the next step is the floor plan layout. Much of the speed and some of the accuracy will result from a laboratory planned for production which embodies (1) compactness, (2) progressive work flow, and, (3) a modern darkroom.

In laying out the floor plan, all unnecessary steps should be eliminated. Any one operation should not incur a maximum travel of more than 5 ft. The progressive steps for work should be so planned that they follow one another in a systematic order.

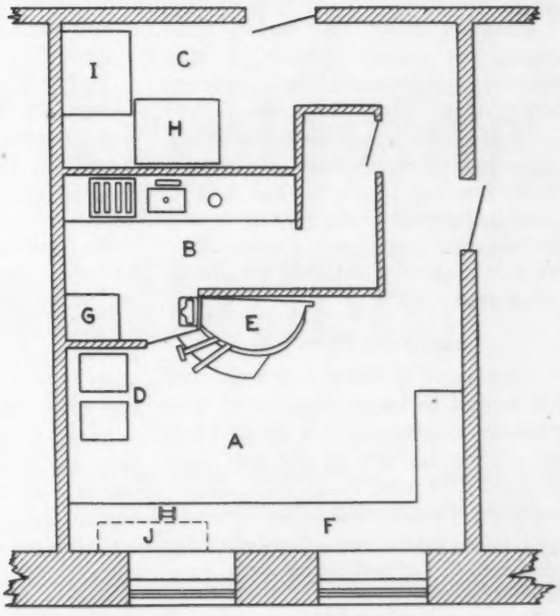
From a study of the working diagram, shown in Fig. 3, it will be readily noted that all work flows from left to right in the following steps: (1) Receipt of sample, (2) preparation of sample, (3) excitation of sample, (4) processing of film, and, (5) evaluation of film.

To obtain this objective, numerous means may be utilized. These devices may include: (1) Installation of racking device for the camera, optical bench, and accessories outside the darkroom to permit checking, changes, and full accessibility in daylight; (2) installation of camera and film loading rack in the darkroom; (3) developing machine, washing rack, and dryer placed in order on a straight bench; (4) exit port through darkroom wall at dryer for transfer of film to densitometer room; and (5) densitometer and calculating board set at right angles to one another for rapid evaluation and calculation, thus eliminating unnecessary steps.

The darkroom should be completely modern. Such emphasis upon the darkroom may seem unusual. However, experience has indicated that the old-fashioned, depressing, cramped darkroom promoted sloppiness, carelessness, and general inaccuracy. The modern darkroom should be light in color. For example, it should have buff walls, white ceiling, and a dark-colored splash belt, as well as safelights throughout the room to illuminate all work centers adequately. The bench will be more convenient if built several inches higher than an ordinary table to accommodate the standing working position. Good ventilation is essential. A darkroom planned in this manner is illustrated in Fig. 4.

Unless a large working space is available, a light trap entrance or maze will be found to detract from the compactness and efficiency. Very often a single door with a short offset vestibule painted dull green will suffice. Storage space, a sink, and a support for the film processing apparatus may be inexpensively incorporated in one bench.

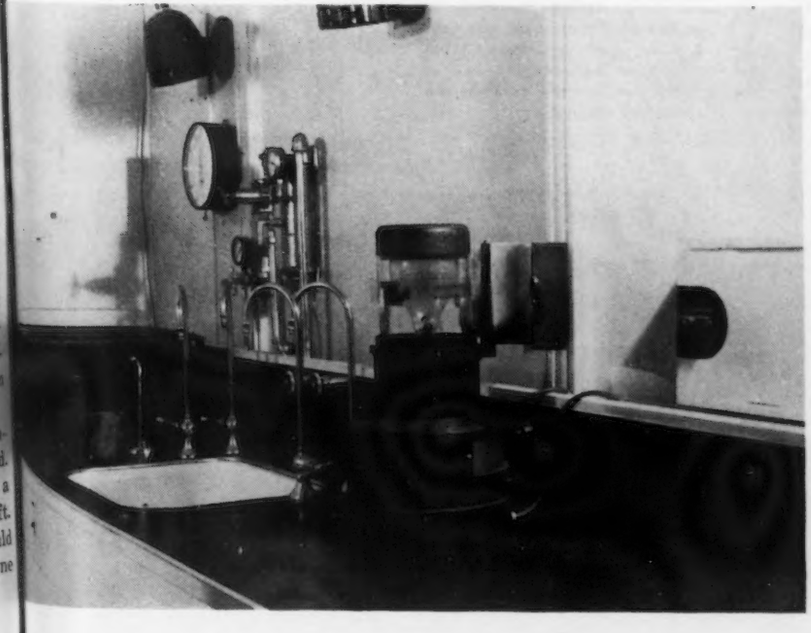
If the darkroom is constructed of steel and situated between the sparking sources and the densitometer, it will serve as an electrical shield against stray high frequency signals that might otherwise affect the densitometer. The diagram shown in Fig. 3 is a suggested model for a production work laboratory and has worked out very satisfactorily in practice.



A-Sample sparking room
B-Darkroom
C-Semi-dark room
D-Excitation units
E-Grating spectrograph with camera in dark room
F-Bench
G-Refrigerator
H-Densitometer
I-Calculating machine
J-Motor generator unit under bench

FIG. 3—The layout of the spectrographic laboratory is exceedingly compact—with equipment so arranged that everything is readily accessible with an absolute minimum of steps.

FIG. 4—This modern darkroom has buff walls, white ceiling, dark color splash belt and safelights above all work centers. At the left is the film developer tray. The unit in the foreground is an automatic film drier with heat from a carbon filament lamp circulated by a fan in the base of the unit.



Character of Results

Rapid speeds of analysis are obtainable with the spectrograph. The unfortunate aspect is that these claims have concealed the real day-to-day performance characteristics. A complete analysis can be made in six or eight min., but this is not customary and from the standpoint of accuracy, in view of the instruments possessed today, is undesirable. On a volume basis, with a constant flow of samples, checked determinations usually required two or three min. However, the actual time elapsing from receipt of the sample to reporting of results will usually fall between 15 and 30 min., depending upon the number of determinations for individual constituents.

Experience has shown that for open hearth preliminary samples, with each element checked in triplicate, copper, nickel, molybdenum, tin, and chromium may be determined in an average total time of 21 to 26 min. For one man, instead of the usual two, the time will be about 27 min.

Accuracy may, by proper techniques, be made exceedingly high with the spectrograph. Such accuracy will throttle speed; hence the desired degree is one compatible to needs and only that. However, that a sacrifice of all accuracy is not implied is indicated in Table II where routine results for the open hearth are shown. Similar values are also obtained for silicon and manganese.

Laboratory Personnel

The subject of laboratory personnel has proved to be provocative of considerable controversy. On one hand is the statement "any bright boy" and on the other hand "only experienced college-trained chemists." In general, it will be found that the following personnel choice will suffice for a routine laboratory:

Analyst: One analyst as trained and experienced as possible, preferably in physics.

Technicians: A total of eight, divided two to an eight-hour shift.

A spectrographic technician is not a "button pusher." Experience with "button pushers" has indicated that accuracy and especially dependability suffer severely. The manipulative technique can be acquired in a few weeks, but the training needed to produce proficient technicians has required a minimum of five months and will depend upon previous training and experience of the individual.

Because of the war situation, the personnel problem is further complicated. Boys taken from high school before graduation rarely show the maturity needed to assist in making the spectrographic analysis for a bank of open hearth furnaces. However, by careful sifting and a long period of training, it is sometimes possible to obtain a force from this source. Women already are represented by several well-known individuals in this field, but again the factor of self-reliance and maturity must be considered. College caliber is the usual requirement.

The problem is thus one of individuals rather than broader groupings. In all, the individual should fulfill the following requirements: (1) Maturity, (2) self-reliance, (3) judgment, (4) manual dexterity of a high degree, (5) a wholesome respect for high voltage equipment, (6) a natural carefulness in the handling of precision instruments, and (7) an expressed interest in this type of work.

While the principal barrier against the spectrograph today is its relative newness, the instrument possesses the speed, accuracy, and low operational cost requisites for widespread range

Safety Device for Turret Lathes

THE operator of a turret lathe or automatic chucking machine sometimes rests his hand on the overhead support bar or the bush while the automatic feed is engaged. This frequently results in a finger being trapped, causing severe injury, sometimes the loss of a finger. In 1936, Alfred Herbert, Ltd., Coventry, England, patented a safety device (Pat. No. 471,345) intended to prevent accidents through a lathe operator's fingers getting trapped between the end of the overhead support bar and the bush on the turret toolholder.

In the past the device consisted of rubber sleeves attached to the toolholders or a rubber buffer fastened to the end of the support bar. Owing to the shortage of rubber it became necessary to find a substitute for the buffer. After experimenting, it was found that a conical spring, as shown in the illustration, was equally effective. The spring safety buffer is now fitted as a standard on all Herbert machines. Standard sizes are shown in the table.

With increased production and a greater number of lathe operators, Alfred Herbert, Ltd., feels that this safety device should be widely known and freely adopted, and the company gives notice that anyone who wishes to make use of this idea may do so.

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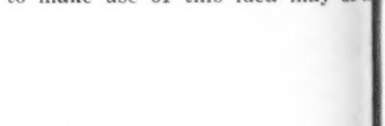
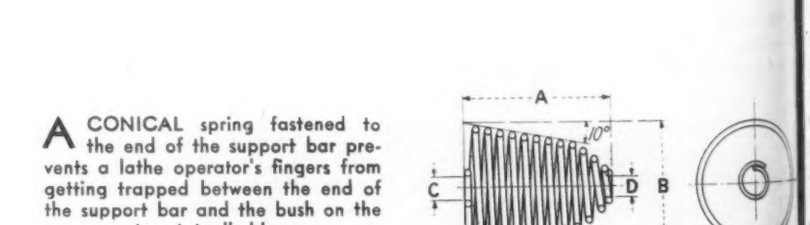
A CONICAL spring fastened to the end of the support bar prevents a lathe operator's fingers from getting trapped between the end of the support bar and the bush on the turret toolholder.





Spring Buffers for Overhead Support Bars

Dia. of Bar In.	A In.	B In.	C(min) In.	D(min) In.
1⅛	1 3/16	1	9/32	¼
1¼	1 5/16	1⅛	11/32	5/16
1⅝	1¾	1½	11/32	5/16
1¾	1⅞	1⅝	11/32	5/16
2⅛	2¼	1 15/16	11/32	5/16
2½	2⅝	2 5/16	11/32	5/16
3¼	3⅜	3 1/16	11/32	5/16

Ford Triplexing Installation

. . . The heavy war demand for steel castings has aroused much interest in triplexing as a means of providing a continuous supply of metal to permit pouring molds on a conveyor, a procedure not practicable with other types of steel melting processes. The largest triplexing installation to date, that of the Ford Motor Co., is described in this article.

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By W. A. PHAIR
Western Editor, THE IRON AGE

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THE largest triplexing installation in the United States for the production of steel for castings was recently put into operation by the Ford Motor Co. This installation, which has a capacity of 600 tons per day on a three shift basis, provides metal for various types of armor and other tank and aircraft castings, weighing from 25 to 1500 lb.

This installation marks a new high point in the renaissance of triplexing*. Metallurgists have been familiar with this process for some time, but it is only since the war that the process has been put into operation on an important scale. One of the outstanding advantages of triplexing, and the chief motivating factor in the Ford adoption of this process for its new steel foundry is the fact that it provides a continuous supply of hot metal, a characteristic lacking in a converter open hearth or electric furnace installation. Another advantage is that it permits charging a wide variety of types of scrap into the cupola, including in some cases cast iron, and yet ending up with a low carbon steel casting. As the new Ford foundry is conveyorized, the importance of a reliable, continuous source of metal is obvious.

The name triplexing derives from the fact that it encompasses progressive treatment of the metal in a cupola, a converter and an electric furnace (or possibly an open hearth), in the order mentioned. The new Ford foundry (Fig. 1) is equipped with four cupolas, four side blow converters and 12 electric furnaces. However, only a portion of these electrics is used with the triplexing operations, the others being used in connection with certain other foundry operations.

**For a description of the triplex process, see "Steel Castings by the Triplex Method," by A. W. Gregg,* THE IRON AGE, *May 7, 1942, p. 61.*

The arrangement of the cupolas and converters is shown in Fig. 2.

The four cupolas (Fig. 3) have a diameter of 96 in., lined to 72 in., giving a rated capacity of 20 tons per hr. The cupola blowers are of the centrifugal type, rated at 12,800 cu. ft. per min. at 2 lb. discharge pressure. These blowers are of the pedestal type with the impellers mounted on their own shaft, supported in two sleeve type bearings. Pressure and volume are automatically controlled. The blast air for the cupolas is preheated in hot blast stoves to about 600 deg. F. The cupolas all have front slag spouts and are acid lined. As protection against the dropping, the legs of the cupolas are bricked up to a height of about 10 ft.

Two cupolas are in constant use, with two acting as alternate or standby units. Slag is run into a trough at floor level filled with running water, through which a metal conveyor runs. The slag is granulated by the water and moved to a common disposal pit by the conveyor.

A typical cupola charge consists of:

- 50 per cent gates, risers, etc.
- 25 per cent low phosphorus steel scrap
- 25 per cent low phosphorus pig iron

Iron from the cupola, at between 2600 and 2650 deg. F. at the spout, is run into 8-ton teapot ladles, where it is desulphurized by use of about 30 lb. of alkali per ton of metal. The iron from the cupola, after desulphurizing, runs approximately 3.00 to 3.25 per cent C, about 1.50 per cent Si, 0.03 to 0.035 S, and 0.05 P.

The iron is taken from the teapot ladles and transferred to the converters in 6-ton transfer ladles. Very little loss of heat is experienced in the teapot ladle.

The converters are side blow Whitings (see Fig. 4), acid-lined, of five to six ton capacity. It is believed that these converters are the largest side blow units in successful operation in the United States. The converters embody several unique features, including centrifugal blowers which are rated at 10,000 cu. ft. per min. and deliver air at 5.5 lb. pressure. The pressure and volume of the air delivered to the vessel is controlled by a butterfly valve automatically operated.

The converters are also equipped with portable, auxiliary push-button controls mounted on a pendant. This auxiliary control simplifies tilting and leveling of the vessel as it permits an operator to hold the pendant control in his hand as he sights through the tuyeres for leveling.

Actual blowing time in the converter is 17 to 18 min., with total elapsed time in handling a blow, in-

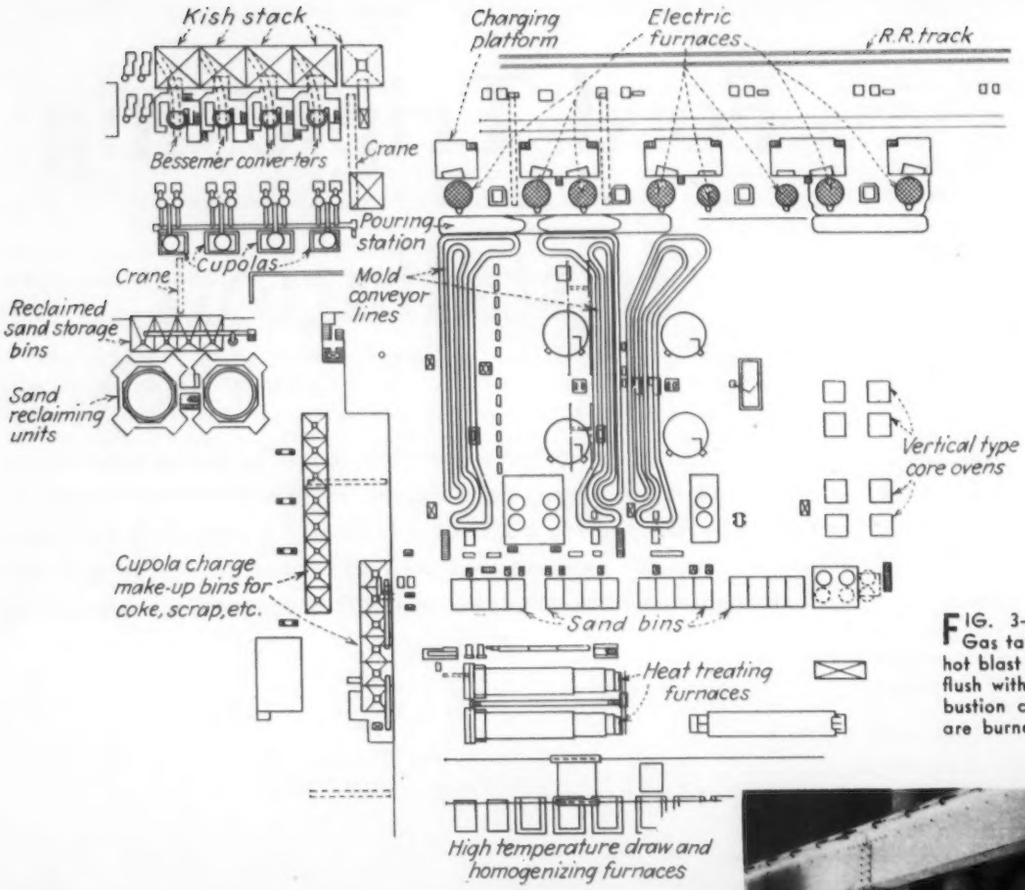

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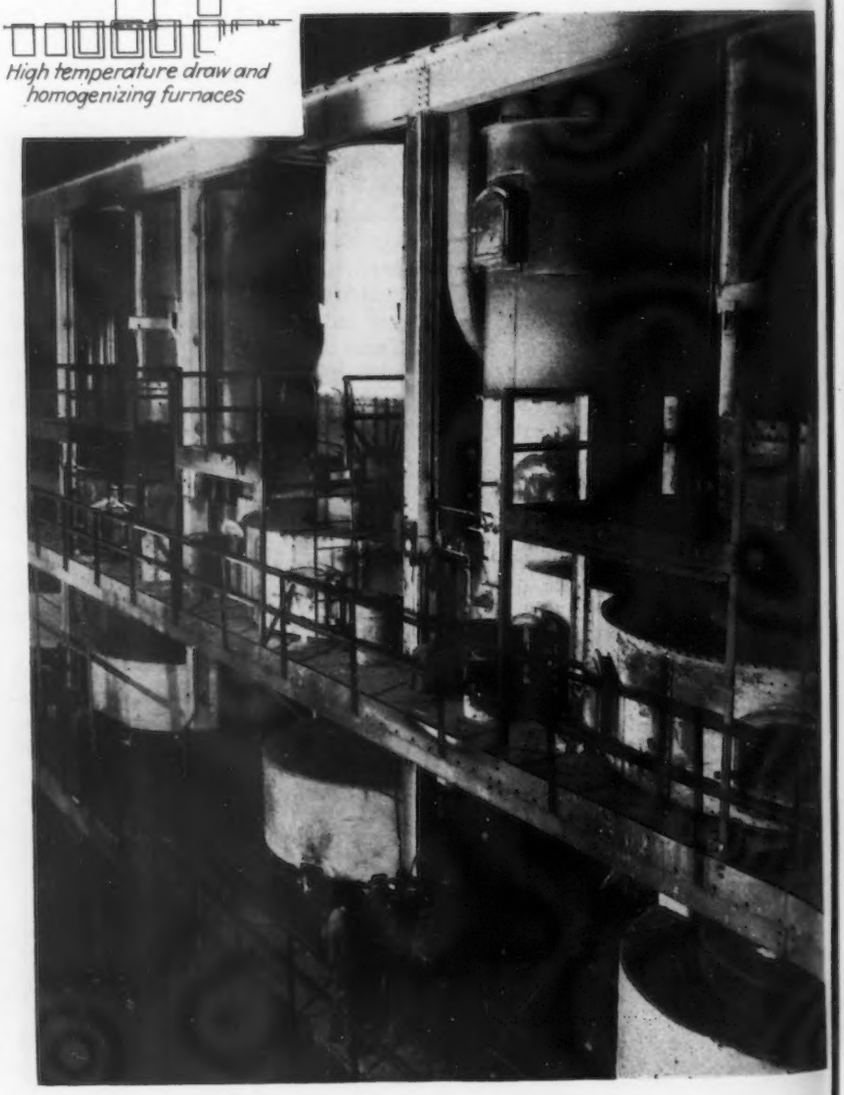
FIG. 1—Floor layout of triplexing section of new Ford foundry. This sketch covers only that part of the new steel foundry devoted to triplexing operations.

BELOW

FIG. 3—Battery of four cupolas. Gas take-off ducts feeding into the hot blast heaters may be seen setting flush with the second balcony. Combustion chambers where these gases are burned are visible between each stack.



cluding transfer, being of the order of a half hour. After blowing, the metal runs 0.06 per cent C, 0.03 to 0.05 Si, 0.05 to 0.10 Mn and 0.03 S. Loss of metal in the converter operation is between 10 and 12 per cent. Temperature of the metal when it leaves the converter is 3000 deg. F.

Samples are taken immediately after the blow and analyses for C and Mn are returned in 12 to 20 min. No additions are made in the converter, but Mn, Si and alloy additions, as required, are made in the electric furnace. Preceding delivery of the blown metal to the electrics, the slag is carefully skimmed off.

A water collector is installed in the converter stack to catch the iron oxide thrown off during the blow. Some thought is being given to the use of the material reclaimed in this manner in some other department of the company. The bottom of the stack is built in hopper form, with a car below the hopper mouth for catching the converter spittings.

The electric furnace equipment at Ford comprises 11 units, all arc furnaces, consisting of nine 12-ton electrics and two 4-ton jobs. However, as previously mentioned, all these units may not be used in the triplexing process. The electrics used for tri-

plexing are all acid lined with transformers rated at 2500 kva.

In triplexing, the electric furnace acts primarily as a holding and mixing unit and its power requirements are correspondingly lower than that of a similar sized unit used for melting. It is estimated that the 12-ton units at Ford would be rated about 4000 kva, if they were used for melting. The company is giving some consideration to the use of an open hearth, in place of an electric furnace, for the third step in triplexing, with the thought that such a procedure might show an economy over the electric unit, yet would make available the same quality of metal.

About 2 hr. are required in the electrics to make the required analysis adjustment and to build up the proper temperature of 3050 deg. F. Emptying of a furnace for pouring takes about 2 hr. at present, but as the men become more familiar with the procedure it is expected that this time will be considerably shortened. The metal leaves the electrics at 3050 deg. F. and is poured at 2950 deg. F. This temperature is very critical for the type of work poured at the Ford plant and is closely controlled.

While at present the electrics are being used for batch operation, there is a continuous overlapping, the effect of which is to give a continuous supply. It is planned eventually to operate with the electrics used as holding furnaces, 5 tons being removed and a new batch of 5 tons being added so that the operation will be wholly continuous.

This procedure contrasts with triplexing installations in other plants wherein the analysis is adjusted prior to going into the electrics and the electrics act as a mixing and holding vessel in order to provide a continuous supply of metal. In the latter installations, only one electric furnace is in operation at a time.

The nature of the work being done in this Ford foundry makes it inadvisable to discuss analyses or physicals of the final product, except to state that it fully meets the high specifications established for the product.

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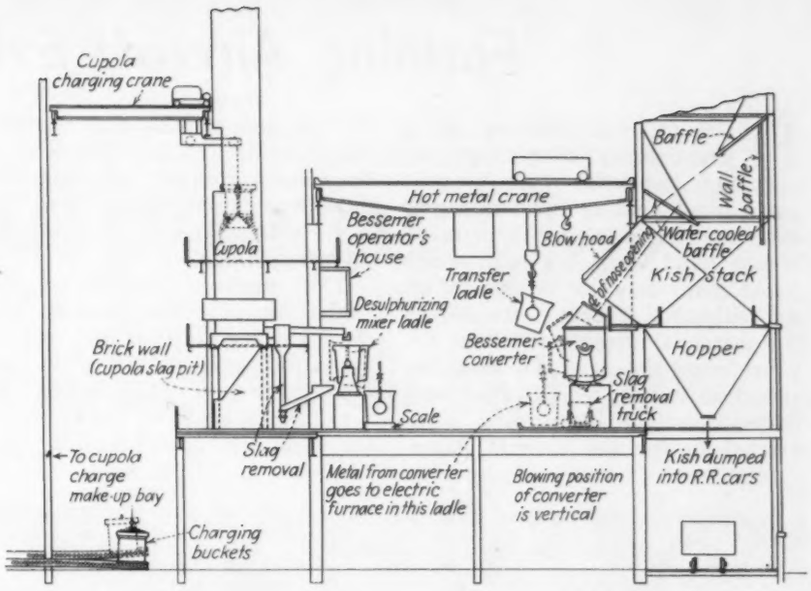

ABOVE

FIG. 2—Section view showing general arrangement of cupola and converters. Melting units are on second floor, a floor above the cupola charge makeup bay.

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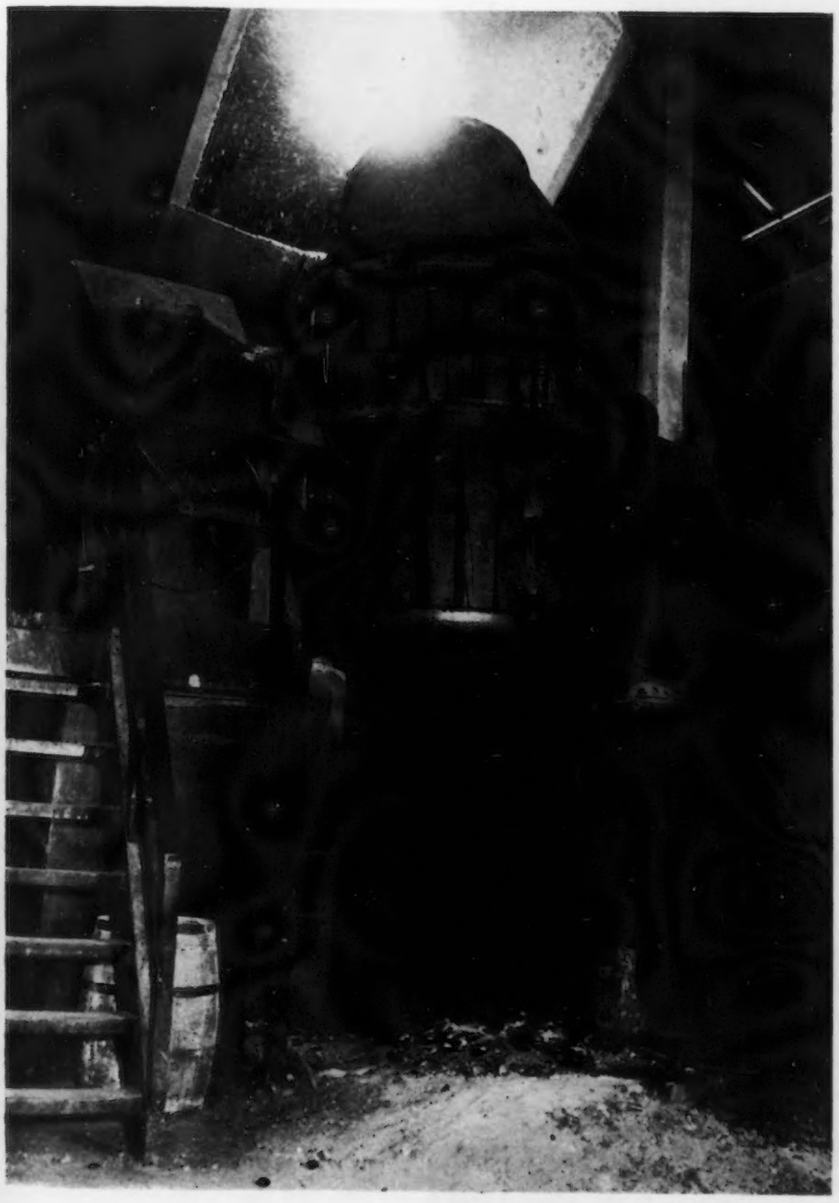


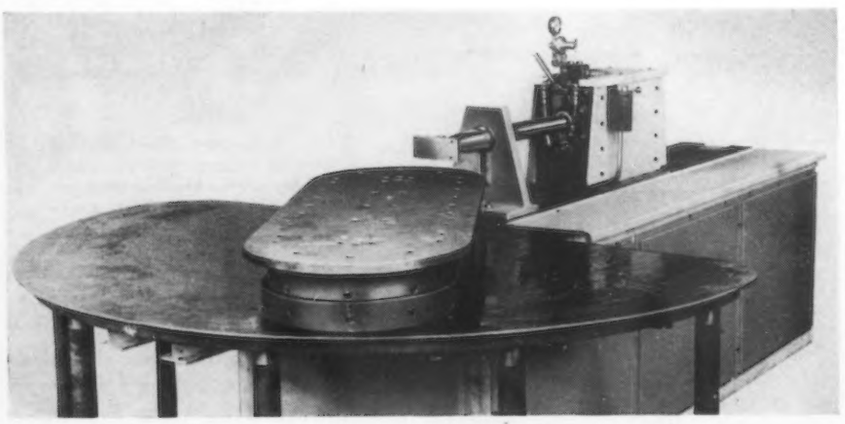
BELOW

FIG. 4—Closeup view of one of the side blow converters blowing.

Forming Aircraft Extrusions

HIGH internal stresses and a great many man-hours are normally associated with conventional hand bending and forming of extruded shapes. Even where much of the hand work has been eliminated, many bending fixtures set up unpredictable internal stresses as the metal is forced into shape between rigid dies. A new machine, specifically designed to overcome these objections in forming dural extrusions for the aircraft industry, has been developed by Southern Engineering Co., Los Angeles. At least eight aircraft companies now use the new unit, which "flows" the metal into shape with an unusual die arrangement.

The machine consists of two basic elements: The movable head onto which a die is bolted, and the air ram to which a mating die is attached. A 5-hp. variable speed reversible transmission system drives the head through reduction gears at an infinite range of speeds between 91 and 275 in. per min. Using 100-lb. air line pressure, up to 2½ tons pressure is exerted by the air ram.

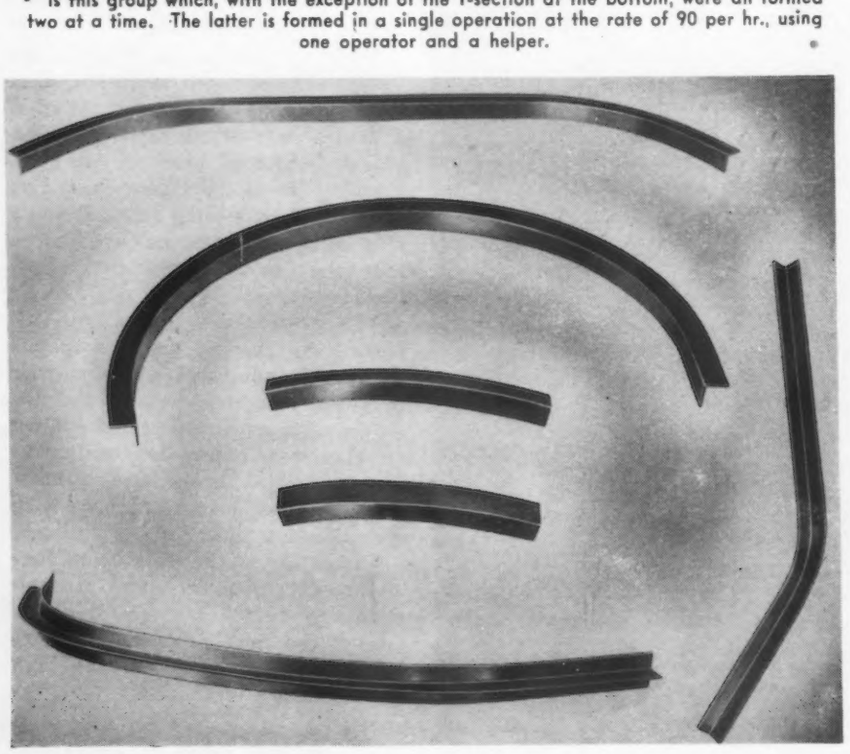


ABOVE

FIG. 1—Extruded shapes are fastened to dies bolted to the movable die head shown in the foreground of this metal forming machine. As this head rotates, a die attached to the pneumatic cylinder in the background bears against the section and forms it to the contour of the moving die.

BELOW

FIG. 2—Representative of the extrusions formed on the Southern Engineering machine is this group which, with the exception of the T-section at the bottom, were all formed two at a time. The latter is formed in a single operation at the rate of 90 per hr., using one operator and a helper.



Formation of straight extruded sections into the desired form, which may involve any number of changes in plane as well as profile, is accomplished by attaching one end of the straight section to the movable die and then drawing it between the movable die and the die block located on the air ram. The extrusion is tightly confined to the cavities of the die, and it is said that any type of extrusion can be formed to the desired shape without danger of wrinkling, and with a minimum of internal stresses. It is claimed by the company that the metal is actually re-formed as it is drawn between the dies.

Three types of movable heads are available: A circular one for the forming of parts that have symmetrical radii or interrupted radii with no straight sections; a semicircular head to form parts with straight sections, slow sweeps, curves and offsets; and a straight head which travels only in a straight line for the forming of wing spar caps, stringers and all other longitudinal parts that have relatively small sweeps or changes in plane. The first two revolve forward to backward, or through a full 360 deg.

A typical example of the speed with which parts can be formed is a double bulb T-extrusion of which only 2 per hr. could be formed by hand methods as compared with a rate of 30 per hr. on the machine. In addition to the higher speed of production, a great improvement in uniformity of parts is reported by firms using the units. A minimum of training is required for its operation, as contrasted to the high degree of skill demanded in hand forming extruded parts.

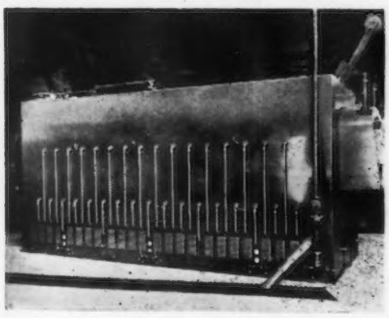
Magnesium, dural and stainless steel can be formed on the machine. Aluminum alloys are best formed in the S. O. condition but S. T. material has been successfully handled. With the use of a mandrel, tubular sections can be formed as easily as conventional extrusions. In addition to tube bending it is possible to make open seam and flanged sections, as well as "hat" and Z sections.

New Equipment . . .

Heat Treating and Process Control

In this week's review, new developments in heat treating furnaces, timers and other accessories are described.

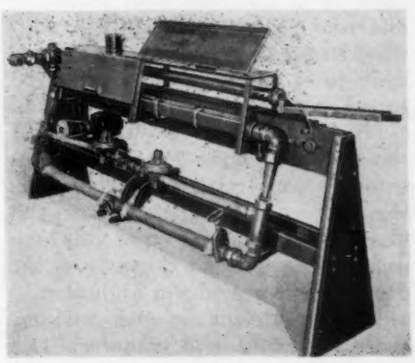
LITHIUM CORP., 111 Sylvan Avenue, Newark, N. J., has developed a heat treating furnace with a capacity of 3000 lb. per hr. Sixty-six specially designed burn-



ers insure even heat distribution throughout the muffle. The furnace does not require any atmosphere adjustments in order to obtain uniform decarb-free hardening regardless of the steel being heated. The chemically-neutral atmosphere nullifies any contaminating influences such as furnace gases, included moisture, occluded moisture on the work, water vapors, etc. A rail roller support for the muffle facilitates compensation for expansion and contraction.

Mouth & Taper Annealing Machine

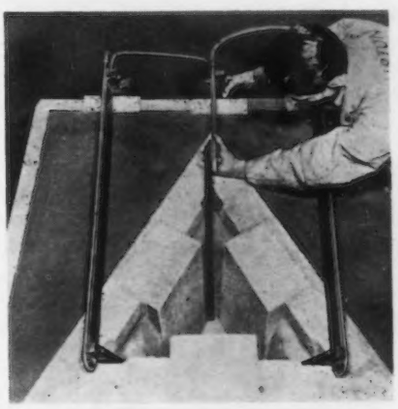
A FLAME-TYPE mouth and taper annealing machine for steel cartridge cases has been designed by the *Morrison Engineering Corp.*, Cleveland. Two general types of machines are available, one accommodating up to 20 mm. cartridge cases, the other for larger sizes. The machine for small size cases is a straight line type, while the larger machine is a modified dial type. In the larger machine, a conveyor chain carries rotating work spindles provided with fixtures suited to the size of the cartridge cases being annealed. The cases rotate as they pass along in front of the flame. Burners are of the blast line type with adjustments to provide compensation for various gases and operating conditions. All controls, including proportional mixers and zero governors, are supplied to provide for a heating section and a holding or soaking section. Burner equipment



may be supplied with height adjustments when cases of different sizes are to be annealed in one machine. Loading and unloading is continuous manual operation at one end of the machine. A sheet metal hood with vent connection encloses the operating mechanism. Hinged sides permit easy burner adjustment.

Triangular Furnace

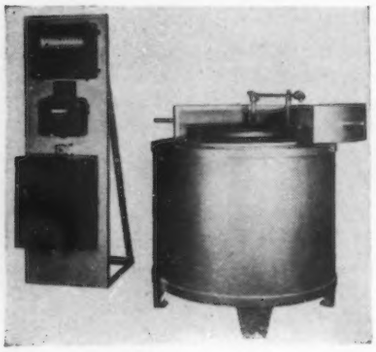
TO insure efficient heat treating operation under power supply conditions that are consid-



ered unsuitable for internally heated salt baths, a new type salt bath furnace has been designed by the *Upton Electric Furnace Division*, 7450 Melville Avenue, Detroit. Of triangular shape, with an electrode in each of the three corners, the pot is bricked so that each electrode is placed in a deep recess in the bricking, eliminating contact with the work. Electrodes are fastened to the water cooled bus bars by a single bolt connection. Two steel pots, one inside the other, and both insulated from each other and from the outside shell of the furnace, reduce heat losses.

Pot-Type Furnace

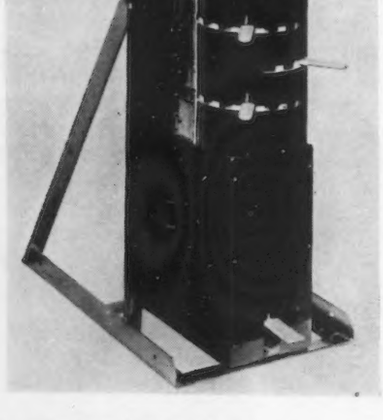
AN electric pot-type furnace, known as the Falcon high temperature salt bath furnace, has



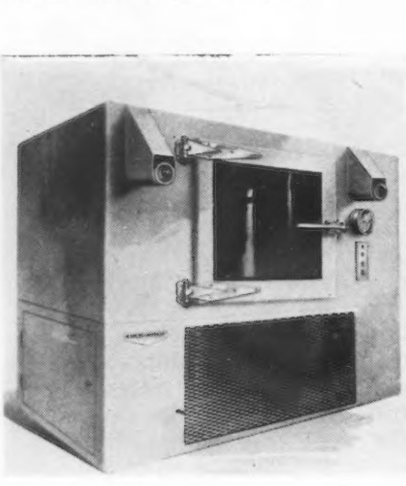
been developed by *H. O. Swoboda, Inc.*, 139 Thirteenth Street, New Brighton, Pa., for cyanide hardening of tool steel products. Operating temperature is 1650 deg. F. High precision controls permit operation at low temperatures for tempering. Heating elements are supported in open face grooves in refractory heater plates. Terminals are brought out through the casing into an enclosed terminal box located on the back of the housing. Capacity is 30 kw., 220 volts, single phase current. The furnace casing is of steel with an alloy pot, suspended from the casing into the furnace chamber by means of a heavy cast intermediate ring.

Temperature Control

ACCURATE temperature may be obtained with the new temperature control for salt bath heat



treating announced by the *Upton Electric Furnace Division*, 7450 Melville Avenue, Detroit. The equipment consists of a panel stand on which is mounted pyrometer, timer, ammeter and signal light. Below the panel is a cabinet with three heat selector levers. The control keeps heat on at all times at a low value. When work is put into the bath, it adds a definite amount of heat for specific interval. When the interval is ended, it reduces the power back to a holding level and warns the operator that the work should be removed. If the operator should make as little as 3 deg. F. error in his settings, the controller warns him of his mistake.

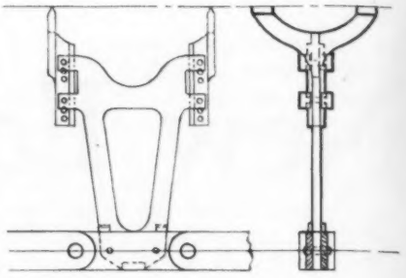


Instrument Testing Machine

THE new Kold-Hold "Hi-Low" machine for testing aircraft instruments, developed by the *Kold-Hold Mfg. Co.*, Lansing, Mich., is offered in three temperature ranges. Temperature ranges are: From —60 to +170 deg. F.; from —80 to +170 deg. F.; and from —90 to +170 deg. F. For the "Hi" side of the machine, strip heaters are located in the air stream for defrosting and rapid heating. For the "Low" side, finned type coils are used. The forced convection air distribution provides a high degree of air circulation in the working space for rapid heat transfer. The condensing unit is a 4, 7½ or 10 hp., 2 stage, air cooled Freon-12 or 22 machine as specified.

Tip for Sheet Carriers

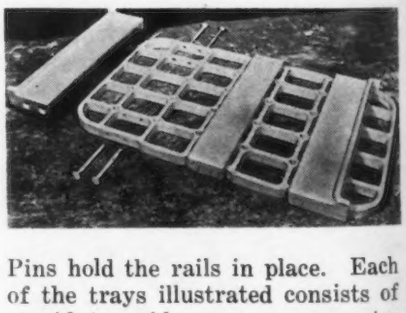
A RENEWABLE tip for sheet carriers used in heat treatment furnaces which greatly prolongs the life of the carrier and conserves critical material has been



announced by *American Brake Shoe & Foundry Co.*, Chicago. A section of conveyor chain with one of several types of carrier blades is shown in the illustration. The lower part of the carrier moves in a slot in the furnace hearth and, like the chain, is largely protected from severe heat and abrasion. The upper section of the carrier is not protected, but is directly exposed to the heat, resulting in distortion, burning and fracturing of the carrier blade. Renewing of the tip requires only a repointing of the tip and an adjustment to raise the renewed tip to the desired height. No welding is necessary.

Carrier Tray

SEVERE thermal strains that lead to cracking and other faults of carrier tray design are eliminated in the new Amsco-Johnson tray, developed by the American Manganese Steel Division of the *American Brake Shoe & Foundry Co.*, Chicago. The rails on the tray are detachable and the tray can be reversed when warpage occurs. It can be straightened by using it under load after reversing.



Pins hold the rails in place. Each of the trays illustrated consists of a grid, two side runners, one center runner and 12 pins. They are used in a continuous type of furnace for conveying small tank and tractor parts which are heated to about 1650 deg. F. and then quenched in oil. The tray is not quenched.

Transfer Car

IN order to facilitate the moving of annealing oven cars from loading area to oven, to quenching

tank, etc., *Whiting Corp.*, Harvey, Ill., has developed a transfer car which performs this work efficiently. A mechanism may be raised to engage a rack attached to the bottom of the annealing oven car. Thus, the operator, safely within an insulated steel and pyrex glass cab can, by pushing a lever, withdraw the hot car from the annealing oven. In addition to three electrical limit switches which make accidental operation impossible, the car is protected with all possible safety devices. All operating parts are readily available for maintenance. There is no third rail or exposed power lines. Current is picked up by a concealed safety trolley.

Combustion Furnace

A HIGH temperature laboratory combustion furnace for use in carbon and sulphur determination of ferrous and nonferrous metals has been developed by the *Harry W. Dietert Co.*, 9330 Roselawn Avenue, Detroit. A feature is the short overall length of the furnace. The Globar heating elements are placed in the furnace at right angles to the axis of the combustion tube. Both ends of the combustion tube are fully exposed to the room temperature. The electrical accessories are housed in the lower compartment of the furnace.

Steel Hardening Furnace

A NEW edition of the No. 2 model Y electric high speed steel hardening furnace has been announced by the *Sentry Co.*, Foxboro, Mass. An asbestos loading shelf of ample width and depth to permit easy arrangement of several furnace loads has been added at the front. New metal guards prevent the possibility of accidental contact with live power supply. Other notable features in the former models have been retained.

Fixture for Hardness Tester

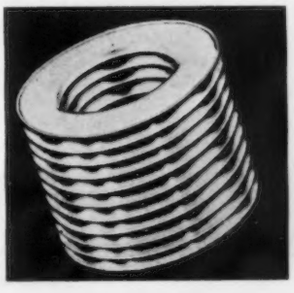
CLARK INSTRUMENT, INC., Dearborn, Mich., has developed a new fixture for its hardness testers, enabling quick checking of hardness of aircraft cylinder walls or other cylindrical objects. The upper post of the tester in which the diamond is usually located is used as a holding post for a gooseneck whose shape enables the lower arm to be inserted into the chamber, where the diamond makes contact with the interior wall. On the

table of the lower post a fixture is mounted on two sliding ways, permitting mounting of the object to be tested at the ends of the ways, after which it can be slid into position where the diamond can make contact. There is no provision for bolting down or otherwise holding cylinders to be tested, their weight being sufficient to hold them in place. Fixtures may be had to fit any size requirement.

The company is also producing a fixture for Rockwell testing of shells. This device makes external tests possible on any tubular form, regardless of length, without bowing the shape of the tube and thus impairing the accuracy of the reading.

Metal Bellows

COOK "Spring-Life" metal bellows, offered by the *Cook Electric Co.*, 2700 Southport Ave., Chicago, are constructed of individually fabricated diaphragms which are joined alternately at inside and outside peripheries. These bellows are built in large diameters and almost unlimited lengths. Characteristics include uniform pressure movement ratio, sensitive low-



pressure response, ability to return to same no-load position, and resistance to corrosion.

Oil Cooler

THE Trane quenching oil cooler, manufactured by the *Trane Co.*, La Crosse, Wis., utilizes the atmospheric evaporative principle. It can be suspended from the truss structure of the building if desirable, thus conserving floor space. Mechanical features include a rigid angle iron framework, high heat transfer, squirrel cage fans and steel spray water tank. The entire casing is given two coats of rust resisting paint before shipment. A pump circulates oil from the quenching tank through the cooler and back to the quenching tank. Any desired temperature not lower than 100 deg. can be maintained automatically.

Temperature Signaling Liquid

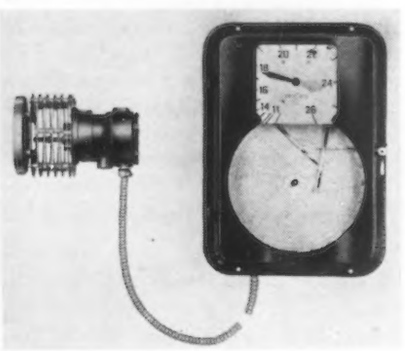
TEMPILAQ°, a new temperature signaling medium in liquid form, has been introduced by the *Tempil Corp.*, 132 West 22 St., New York. The product is available in a wide range of predetermined melting points between 125 and 1600 deg. F. A thin smear or daub applied to the working surface dries instantly. When the temperature stated on the bottle is reached, the smear liquifies sharply. On cooling, it solidifies, leaving a glossy or vitreous mark distinctly different from the original smear.

Automatic Electrical Timer

A SIMPLE electrical timing device has been announced by the *Philco Corp.*, Tioga and C Streets Philadelphia. This automatic time switch is arranged to close an electrical circuit after the expiration of a predetermined time. When used on a.c. circuits, it has a capacity of 1200 watts, sufficient to control a 1-hp. motor of the repulsion induction type. The setting operation merely requires the turning of a knob to the time the switch is to operate. A series connector with 5 ft. of heavy duty cord is supplied to simplify connections to plug-in types of electrical equipment. The connector plugs into the electrical outlet and the apparatus to be controlled plugs into the connector. The installation is completed by fastening the timer to the wall directly above the electrical outlet, at a convenient height.

Radiation Pyrometer

THE BRISTOL CO., Waterbury, Conn., has developed a radiation pyrometer known as the Pyrovac. This new instrument is designed for recording, indicating, or automatically controlling temperatures in furnaces and kilns above 900 deg. F. The temperature sensitive unit or radiation head is mounted on the outside of the furnace where it picks up heat rays emitted from the object under measurement, thus registering its surface temperature. The Pyrovac



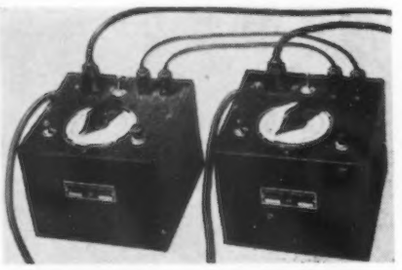
radiation pyrometer is intended for use in measuring and automatically controlling high temperatures out of the range of the thermocouple, temperatures for which rare metal thermocouples are used, and also surface temperatures.

Liquid Paint

PARK NO-CARB, offered by the *Park Chemical Co.*, 8074 Military Avenue, Detroit, is a liquid paint for the prevention of carburization or decarburization, for use on molybdenum high speed tools or alloy steels. The paint can be applied upon removal from the can, after stirring, by brushing, dipping or spraying. It is especially suitable for use on fine threaded work, due to slight removal difficulty. No-Carb can be removed after steel treatment by sand blasting or immersion in a boiling hot solution of ammonium bifluoride in a wood, lead or copper lined tank.

Electronic Timer

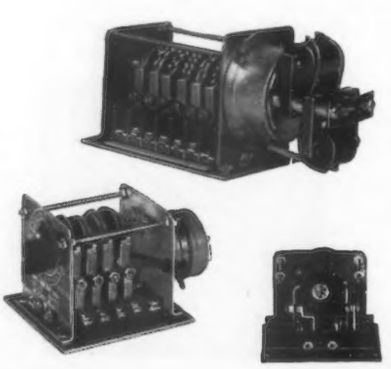
PHOTOVOLT CORP., 95 Madison Avenue, New York, announces an electronic timer designed for single actuation as well as for sequence timing and re-



cycling in continuous operation. When the timer is actuated, a charged condenser begins to discharge, the rate of discharge being controlled by adjustable resistors. Simultaneously with the actuation, amplifier tubes energize the relay. When the discharge of the condenser is completed, the amplifier tubes become inoperative and the relay is de-energized. Timing is from 1/20 sec. up. After completing the timing period, it does not take more than 1/60 sec. to recharge for the next operation. The timer is provided with a load outlet carrying 110 volts and is adjustable for "normally open" or "normally closed" circuits. It can be actuated either by push button or by an external switch such as a foot pedal.

Multi-Contact Timers

TO automatically control a sequence of on and off operations of a single or multiple number of electrical circuits in accordance with a pre-determined operating program, *R. W. Cramer Co., Inc.*, Centerbrook, Conn., has introduced a line of multi-contact timers. Features of the line include self-starting synchronous motor, complete gear trains operating in oil, and bakelite cams mounted on shaft in identical pairs so the off and on increments can be adjusted to desired



operating program. The timers can be manually operated. Contacts are in plain view.

Reset Timers

THE new RS4 and RS5 synchronous motor driven timers, offered by *R. W. Cramer Co., Inc.*, Centerbrook, Conn., are of the reset type and are available for time ranges up to 5 hr. and longer. These timers repeat their time cycle upon manual operation of a built-in start button and indicate the expired and unexpired time cycle as well as the setting time. The RS4 timer, illustrated, has a double throw switch and opens or closes the circuit, and starts by pressing and then releasing the start button, which also resets the timer. These timers oper-

RS4-M5

ate a single pole, double throw switch with a capacity of 10 amp. at 115 volts or 5 amp. at 220 volts, a.c. non-inductive load.

Conveyor

A SPIRALVEYOR has been developed by the *Salem Engineering Co.*, Salem, Ohio to be used for removing large quantities of heat treated parts from the quench. After removing parts, the Spiralveyor conveys them to a pickling unit at a rate of 8000 lb. per hr. The unit is an inclined 18 in. diameter perforated steel tube through which a spiral conveyor screw operates and carries the parts up through the tube and out of the quench. The wall of the tube is perforated with 9/32 in. holes and the water is tumbled out of the components, permitting the parts to enter the pickling solution without diluting the bath with water.

Incredible Uncle Ishmael

...the one-man army!

UNCLE ISH is the derndest feller. He paid 4½ cents for that weapon, and he can shoot a clay pipe right out of your mouth at 100 yards. What's more, he's a one-man army. . . . Incredible? Well, here are the facts:

The famous Robbins & Lawrence and E. G. Lamson companies, ancestors of Jones & Lamson, had working for them in the 1800's two of the finest gunsmiths in the world. They were Albert Ball and Benjamin Tyler Henry, and the genius of these two men contributed much to the invention of a gun that was destined to make history.

That gun is known throughout the world today as the famous Winchester rifle — but in an earlier form, as the Ball lever-action repeater, it was known only as a headache to E. G. Lamson & Co. For there was a large order from the government for this revolutionary firearm, to replace the muzzle-loaders being used in the Civil War, but the war ended before delivery could be made.

The result: Hundreds of these repeating rifles were put up for sale at one-half cent a pound—and Uncle Ishmael got one. Nine pounds of the greatest gun in the world, for 4½ cents!

Later, when the patent for Ball's lever-action magazine was purchased and combined with improvements in rifle design made by Henry and another gunsmith named King, the great Winchester rifle was born. And it was an early advertisement for this rifle that told how Uncle Ishmael was a one-man army. "A man armed with one of these rifles," it read, "can load and discharge one shot every second, so that he is equal to a company every minute, a regiment every ten minutes, a brigade every half-hour, and a division every hour!"

The company in which that famous firearm had its origin is known today as Jones & Lamson, and the gun is typical of many great American products that have stemmed from the tools — and the men — developed by this company.

Jones & Lamson engineers and service men are at your call today . . . right now . . . to help you in solving the difficult problems of present and post-war readjustment.

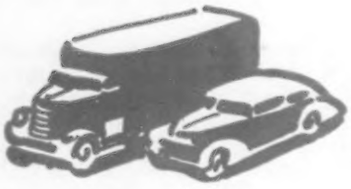
JONES & LAMSON
Machine Company
SPRINGFIELD, VERMONT, U. S. A.
Profit-producing Machine Tools

Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers.

Assembly Line . . .

STANLEY H. BRAMS

• Willys-Overland arms output represents giant advance over peacetime level . . . Tank-Automotive Center deviation permits allow variations in specifications.



TOLEDO—Willys-Overland Motors, Inc., erstwhile pigmy in the automotive industry, is blooming to full size. The company has had perhaps the greatest proportional advance in its activity of any in the industry; today's volume is at a rate roughly 10 times that in effect immediately preceding the start of the war. As against payrolls of about 1600 men who worked four days in all of January four years ago when Joseph W. Frazer took over the presidency of the concern, there are today over 13,000 workers on the payroll, and the total is growing daily, pointing toward 18,000 by early summer.

Best known to the general public for its production of jeeps, Willys-Overland is in high volume output on many other military requirements, some of which are considerably more complicated than the manufacture and assembly of the ¾-ton scout-reconnaissance cars with which it has become identified. Willys-Overland is an important supplier to the Navy and to the Army Air Forces as well as to the Army.

Some 25 tons of steel per hour flow into the plants at Toledo for production of 155 mm. shells alone. This operation is the biggest heavy shell program going forward in volume today. To turn these shells properly, required exceptionally heavy Hepburn lathes which had to be imported from Canada in order to start production moving. The volume and satisfaction achieved on this job was a factor in the award of further contracts to Willys-Overland.

Also in the munitions field occupied by Willys-Overland are bullet cores, more than a million of them produced daily. These cores are screw machine products, heat-treated and centerless ground.

Fuses and primers are made for the Navy. The fuses are definitely complicated pieces of apparatus, all parts of which must be made to precision standards.

For the Navy, also, Willys-Overland is manufacturing gun breeches for 1.1-in. pompom guns.

MORE important are the intricate Navy powder and projectile hoists produced for the 5-in. guns on cruisers and battleships. These hoists move ammunition from powder magazines to guns; they are 12 ft. high and weigh three tons; their cost is almost that of a Gen. Sherman tank. In addition to increasing ship fire power by speeding it up, the installation of these hoists permits anti-aircraft firing in the event of air attack. Each hoist is equipped with a special fuse setting device aiding in the accuracy of anti-aircraft fire by regulating the explosion of the projected shell. There are some 3000 individual parts in each hoist, most of which must be machined to extremely close tolerances.

For the aircraft industry, Willys-Overland is operating the second largest aluminum forge in America. This forge supplies requirements to a number of the aircraft manufacturers as well as to purveyors of aircraft equipment in the automobile industry.

Some of the metal from this forge is utilized to build center sections of Vought-Sikorsky Corsair fighter ships for the Navy. In addition, landing gear is built for Grumman fighters made by the Eastern Aircraft Division of General Motors for the Navy.

Willys jeep production to date must be tallied in six figures. These units are as nearly all-purpose as any vehicle can be which is utilized by the Army, employment ranging all the way from message-carrying up to tank fighting. Today's delivered price to the government has been reduced to a level little more than half of the original going price which the jeep first broke into the military picture before we entered the war. American Bantam and Ford share this production.

It is around the jeep that Willys-Overland is developing hopes for a balanced post-war picture. Obviously the jeep is not adaptable as a passenger car as it stands, for its heavy frame, four-wheel drive, and other at-

NEW TANK DESTROYER: This is the first photo of one of the Army's latest weapons for land combat. It is a newly designed "tank destroyer," known as the M-10, a speedy, maneuverable land cruiser with great firepower. Here the destroyer goes through tests at the arsenal of the Fisher Body Div. of General Motors, Detroit.

Press Assn.

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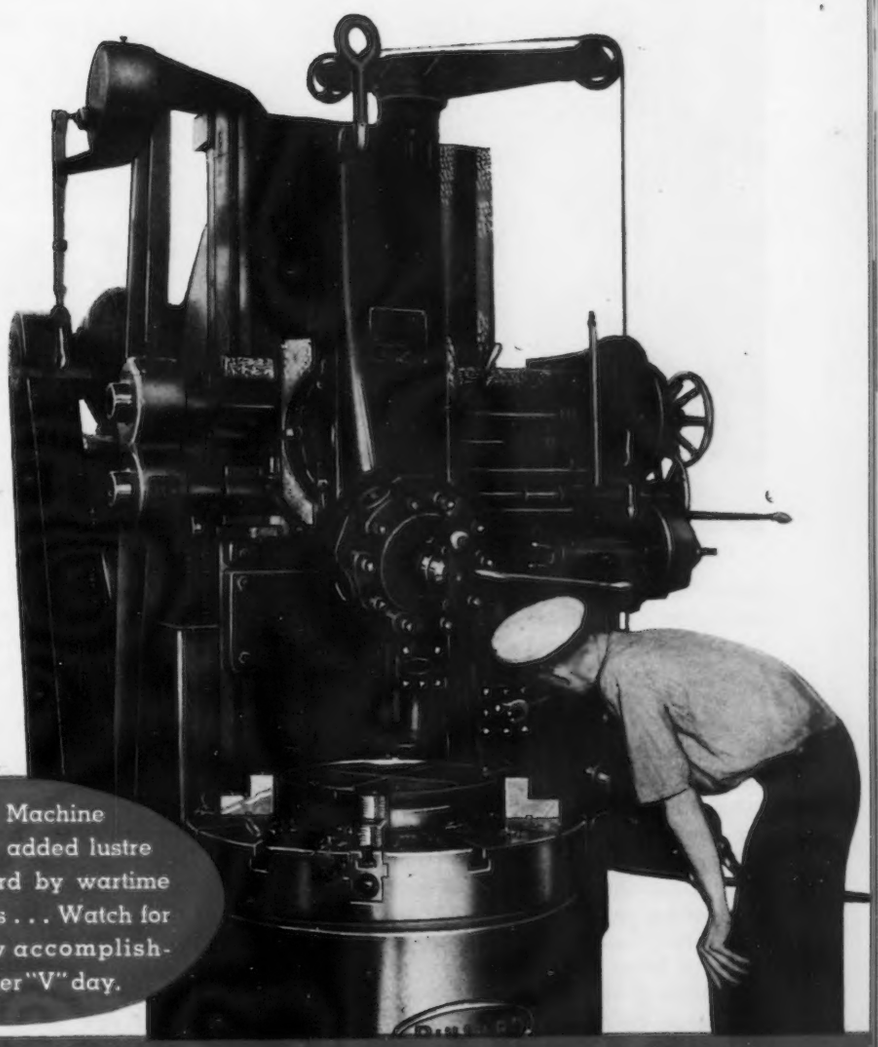


"Going to peace" on the day of Victory will mean no slowing of pace for American production. On the contrary, it will be the threshold of a greater industrial era than we have yet witnessed.

Plants must go ahead full blast. Not a single usable machine can be allowed to stand idle. And those easily adaptable to the output of consumer goods will be "more precious than rubies."

The Bullard Vertical Turret Lathe — and the Bullard Mult-Au-Matic — are among America's foremost machine tools suited to this coming emergency. The thousands in war service will be equally efficient for peacetime production. Their economy will be apparent then as never before. Their quick adaptability will necessitate no "junking" or replacement, no long, costly re-tooling.

Bullard Machine Tools have added lustre to their record by wartime performances . . . Watch for greater new accomplishments after "V" day.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

ARMY E NAVY

tributes are more rugged than passenger cars require today. What Mr. Frazer and others in Willys-Overland are contemplating is the sale of the jeep in export markets and home markets as an all-purpose vehicle for farms. It is envisioned as a combination truck-tractor-and-passenger car, whose single presence on any rural establishment would replace all those three vehicles. In this viewpoint, Willys-Overland may have a tangible and logical stand, one which will serve to strengthen its post-war position.

BUILDING of the four-cylinder motors which power the jeep is in larger volume than assembly of the vehicles themselves. The engines are being used to a considerable extent for generating electrical power for searchlights, for arc welding equipment, centrifugal water pumps for fire fighting, short wave radio transmission receivers, and other field apparatus. Converted to marine use they are being widely employed by the Marine Corps as power plants in lifeboats and similar small craft.

These jeep engines, which develop 61 hp. at 3800 r.p.m., are also going into the home front battle, driving tractors in munition factories and being used in farm production as power units for thrashing, cutting wood and doing other agricultural chores.

At Detroit, meanwhile, the Tank-Automotive Center's Engineering Branch has installed a new system on materials specifications in order to expedite production of tank and automotive vehicles. The system is devised to permit substitution of specifications when a manufacturer finds it impossible to obtain materials specified, due to shortages of alloy steels.

To handle substitutions of materials with a minimum loss of time, requests for permission to make changes are sent to the Tank-Automotive Center by manufacturers and Ordnance offices throughout the country. Anticipating these, TAC has on file the service requirements for all tank and automotive parts, having evolved this information after adequate testing carried out in cooperation with various branches of industry, including both consumers and producers of steel and iron. Thus the information on file shows the lowest grades of steel or iron which will meet service requirements without loss of military efficiency in the vehicle.

When the manufacturers are unable to obtain the steel on the drawing, they request a substitute and are advised by the TAC Engineering Office which substitutes are possible and available. In many cases it is possible to permit the use of a number of different substitute steels, any of which will meet service requirements and which, in general, contain amounts of alloy element considerably less than those of the originally specified metals.

The required substitution is sent on as a "deviation permit". This permit goes not only to the manufacturer requesting permission to make the change, but also to all Ordnance districts, so that it is available at once to all manufacturers throughout the country. Quite often this eliminates the necessity for a manufacturer in some other district asking for information on the same part.

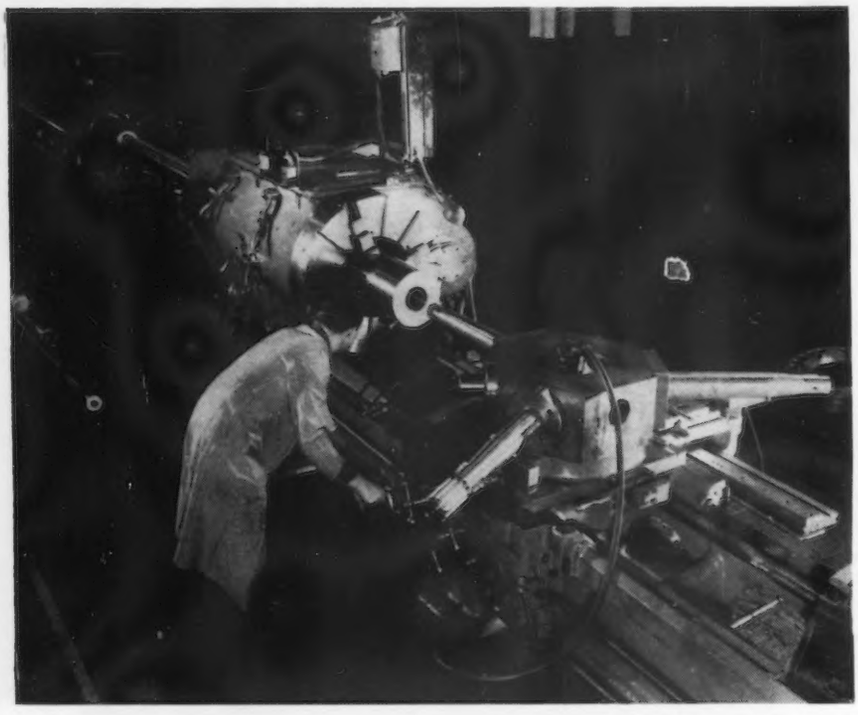
In many cases it has proved possible to approve substitution of less strategic materials in a form which is advantageous to some industries. For example, a bronze part, highly strategic, may be replaced by a malleable casting which is readily available because of sufficient foundry capacity.

Ordnance requirements and specifications appear to be in fairly fluid state, due to the considerable amount of information piling up on available substitues. The Army, too, has quite definitely turned to wide utilization of NE steels, probably considerably more than any other branch of the service; there are some estimates that Army specifying of NE steels represents at least a third of the total steel specifying.

In this respect, elimination of the bulk of the 8700 series was somewhat disconcerting to Ordnance officials, inasmuch as they had turned to it in quite considerable degree during the past months. Indications from supplying sources are that the 13 series steels are coming in for quite a bit of specifying, but that the 9400 series is also being stressed importantly.

By contrast, so far as Detroit plants are concerned, the Navy and the Army Air Forces are specifying comparatively small amounts of NE steels.

ORTHODOX METHOD ABANDONED: In the machining of powder chambers Chevrolet Motor Division formerly required 16 man-hours for the job, using a two-blade wood-packed reamer forced into the tube, compressing the wood in taper and often scoring or chipping inner surfaces. By developing an air-driven grinding spindle built into a turret lathe with profiling attachment, the company's engineers have reduced the time cycle to eight man-hours, and have reduced scrap.



DPC Contract Authorized

Pittsburgh

• • • **Defense Plant Corp.** has authorized a contract with H. K. Porter Co., Inc., here, to provide equipment for a plant in Pennsylvania at an approximate cost of $100,000.

More GOOD WELDS per Man-hour

with SMITH A.C. Arc Welding Machine

and SW-15 Electrodes

OF course, you want more *speed* in welding operations. Who doesn't? But speed alone is not enough. You also want good, strong, clean welds. The Smith A.C. Arc Welding Machine and Smith Certified SW-15 Welding Electrodes is the team that gives you both.

Designed and built to carry heavy loads continuously, the Smith A.C. Arc Welder should not be confused with intermittent-duty machines. We designed this machine ourselves. We built it for our own use in our own huge welding plants where a welding machine *has to be able to "take it and hand it out"!*

NO ARC BLOW—Because this is an alternating current welding machine, there is no arc blow for the operator to "fight." He makes difficult welds *easier, faster,* and *better.*

SAFE OPEN-CIRCUIT VOLTAGE—Open-circuit voltage is about 70 volts and does not vary more than 2 to 4 volts between maximum and minimum output settings. Potential, however, is adequate to strike and maintain the arc easily.

HIGH POWER FACTOR—At full load, power factor is 85% to 90%; at 50% load, power factor is unity; at no load, leading corrective K.V.A. improves the average power factor of the shop line.

OUTPUT CONTROL—Output of the Smith A.C. Arc Welder may be varied *while working* without breaking or altering the fundamental characteristics of the circuit.

SW-15 ELECTRODE—Shielded Arc Universal Type mild steel electrode for flat, fillet, vertical, or overhead welding. While especially suitable for teamwork with the Smith Arc Welder, it also gives excellent results with direct current.

SW-15 is one of the complete line of Smith Certified Welding Electrodes —

Mild Steel... High Tensile... Stainless Steel

WELDING ELECTRODES *Made by welders... for welders*

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Washington . . .

L. W. MOFFETT

• Examination of captured German equipment shows much of interest, including Nazi practices similar to ours . . . Dispute over use of open hearth alloy steel for U. S. aircraft analyzed . . . Concentration of orders may remove some choke-points.

WASHINGTON—"The British really like American tanks, guns and other equipment," said Maj. Gen. Levin H. Campbell recently. General Campbell told THE IRON AGE that the English especially admire the performance of the American M-IV tank, popularly known as the General Sherman.

General Campbell, one of the country's foremost production experts, is very human and has a sharp sense of humor. He related the following story to illustrate the reaction of a Tommy to a suggested change in the M-IV:

"It seems that some of our 'monkeys' believed that the tank's 75 mm. gun sights needed improvement. An American officer in search of first-hand information, approached an English tankman, one Nichols, who was famed in England for being a poacher.

" 'What's wrong with the gun?' the officer queried.

" 'Not a damned thing!' Nichols replied.

"The officer subsequently learned that Nichols, operating a General Sherman, had a record of knocking out 19 German tanks!"

Examination of captured German arms shows that the enemy is making metallurgical substitutions comparable to those made by the United States, General Campbell said when asked about German weapons. The Ordnance Chief said that substitutions have not reached a point where it is apparent that material shortages force Germany to sacrifice metal quality where it is needed.

In contrast with this, late information obtained from military observers fresh from the North African front, reveals that the workmanship of certain German weapons is decidedly inferior to that of American ordnance. It has been discovered that German bomb fuses have a low degree of explodent quality. While performance data of American bomb fuses cannot be revealed for security reasons, they are highly efficient, General Campbell said.

Press Assn.

STETTINIUS ON LEND-LEASE: Using this chart to show the course of Lend-Lease shipments about the world, Lend-Lease Administrator E. R. Stettinius, Jr., tells the foreign relations committee at a hearing in Washington, March 1, that Lend-Lease shipments are not responsible for any food shortage in the U. S. He declared every effort is being made to increase shipments to China. Size of arrows indicates relative amounts of Lend-Lease shipments to various allies.

German tank armor has been found to consist of heat-treated carbon steels containing little or no alloying elements. This is also American practice where armor resistance is not judged by how rich the steel analysis is in expensive and scarce alloys, but the test is whether armor is ballistically satisfactory. The heat-treating technique has long been known as a substitute for alloys, imparting to metal impact strength. The Ordnance Chief pointed out that Army specifications had been revised through consultation with industry to reduce the nickel content in a medium tank from 600 lb. to 34.

As the United States industries move into the 65th week of the war, it becomes increasingly apparent that munitions drain on factories has become so demanding that distribution bottlenecks are developing all the way from components to steel products. Efforts to smooth production out are being taken by WPB through the issuance of production directives on components. The tough spot in steel is alloy steel which is about to receive the same treatment.

Developments which can be expected are actual surveys of consumer inventories of processed parts, an attempt to balance inventories, making the melting of NE steels mandatory, and requiring consumers to increase the use of open hearth alloy steels. Moves taken by WPB will tend to prevent preference ratings from having much effect on melting schedules and to make special efforts to keep critical alloy steel needs harmonized on schedules to counteract the effect of special directives.

The 100 octane gasoline and synthetic rubber programs are said to be retarding electric furnace expansion according to schedule and this spurs attempts to develop greater open hearth alloy steel making. Hot-topping equipment can be secured more

POINTERS

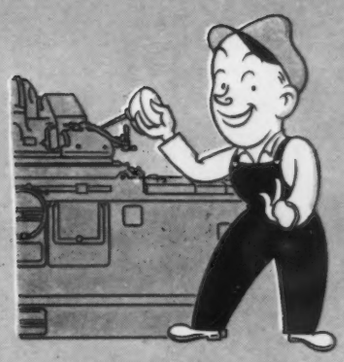
ON KEEPING YOUR CINCINNATI PLAIN GRINDER RUNNING . . . LONGER . . . MORE EFFICIENTLY

A SIMPLE, easy-to-follow routine and common-sense precautions will do much to keep your machine tools running longer . . . more efficiently. Here are a few pointers for CINCINNATI 10" Plain Hydraulic Grinding Machines:

1. Lubricate your machine daily, using oil of the recommended specifications. Change oil as recommended; oftener if shop is dusty or if machine is operating three shifts. Lubrication schedule tag tied to machine will help.
2. Change replaceable filters and clean spindle oil filter when changing oil. New filters are cheap insurance against machine breakdown.
3. Accurate work tolerances require periodic releveling of the machine. Foundations are rarely stable enough to maintain the accuracy of initial leveling.
4. High grade finishes require clean coolant. Remove sludge from coolant reservoir once or twice a week.
5. When changing wheels, remove collet and clean out drain hole. This simple precaution will keep coolant out of spindle oil.
6. Use handwheel retraction of footstock center for heavy work and when removing stock rapidly. Don't take a chance on work jumping out of machine.

CINCINNATI

CINCINNATI 10" Plain Hydraulic Grinding Machine. Advantages and engineering specifications fully covered in catalog G-490. Copies available at no obligation whatever.



Follow printed instructions in lubricating your machine. An oil schedule tied to the machine will help, and a central lubrication department will do a better job.

Check level of machine periodically, and relevel if necessary. How often depends upon type of foundation. Check after first month of operation.

Remove collet at least once a month and clean drain hole and slinger grooves.

Item No. 1—the most important factor of longevity and high efficiency in machine tools—is fully covered by our lubrication booklet, No. M-1084-2. Copies available on request.

CINCINNATI GRINDERS INCORPORATED

CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

easily than whole new electric furnace units and requires less material. The problem continues to be one of getting certain of the armed services to accept open hearth alloy steel.

ONE dispute is between the Army Air Forces on the one hand and WPB and other units of the War Department on the other hand over the suitability of alloy steel produced in the open hearth for aircraft. The Air Forces insist, according to WPB sources, that no steel is good enough for aircraft construction except electric furnace alloys. The Air Forces argument is that elastic furnace heats are uniform and consequently electric furnace steel is uniform in analysis. It is claimed, for example, that an open hearth bar of alloy steel might vary slightly in analysis at its opposite ends.

Actually, it is contended there is nothing in War Department specifications which requires that electric furnace steel be used in aircraft. War Department procurement officials are said to be anxious to use open hearth alloys. But the Air Forces say that if it is used, procurement officials and steel companies must assume responsibility for any mechanical failure which might occur to a plane built of open hearth alloy steel. Naturally, though metallurgists aver there is no appreciable performance difference, the Air Forces' insistence that open hearth alloy steel use be underwritten, has prevented its use for this purpose to any great extent.

Press Assn.

WHAT'S BUZZIN' COUSIN?: "Illegitimate absenteeism is a first cousin to slackerism," stated Admiral Emory S. Land, chairman of the Maritime Commission speaking before the House Naval Committee on March 4 in Washington.

Some inventories have grown enormously beyond ability of consumers such as tank and airplane manufacturers to put in process, although no reliable statistics are available. An example of this is the report of one investigator who found that one Army procurement district had 55 years' supply of locks and 116 years' of fine wire, measured at normal consumption rates. Processed alloy steel parts are said to be correspondingly high at some factories and obvious means suggest themselves to cure this condition. Future allotments of alloy steel can be reduced, excess stocks can be redistributed, or melt schedules so set up to effectuate inventory balancing.

Ordering practices have been noted as contributing factors in distribution unbalance. One practice is sloppy scheduling by consumers which does not accurately forecast delivery dates to insure that alloy products are received when needed. Preliminary inventory examinations have shown that this is the reason for excessive inventories. The lack of accurate information on the breakdown of ingots as to end product prevents more balanced steel distribution.

Moves toward concentration of orders for particular products in designated companies may eliminate some choke-points. However, the administration of the scheduling order issued recently by Charles E. Wilson, WPB Executive Vice-Chairman, will have to take into consideration the relative need for alloys in the most critical munitions. Particular regard will have to be paid to the suitability of facilities to produce various analyses of steel and the munitions plants requiring them.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THEY'RE ENLARGIN' TH' SHOP AGAIN AND YOU'LL BE NO MORE--SO FAREWELL, OLD PAL, AND THANKS A MILLION FOR TH' HAPPY DAYS ALONG THE OL' CREEK! AH, TH' THINGS YOU HAVE SEEN--TH' LOVERS, TH' KIDS, TH', TH'--(GULP)
GOOD GOSH! I CAN'T SAVVY A KID HARDLY OUT OF KNEE BRITCHES GITTIN' SENTIMENTAL OVER TH' PAST THAT'S AN OLD MAN'S!
OH, NO, NOT ANY MORE! THE OLD SWIMMIN' HOLE USED TO BE STILL THERE WHEN YOU GREW OLD--NOW A KID'S LUCKY IF HE GROWS OLD ENOUGH TO GIT A SWIM IN IT BEFORE A SHOP GROWS OVER IT!
J.R.WILLIAMS
YESTERDAY'S SUBURBS
T. M. REG. U. S. PAT. OFF. COPR. 1943 BY NEA SERVICE, INC.
3-12

WPB Revokes Preference Ratings for Construction

Washington

• • • **The War Production Board** has announced that construction of facilities for the production of butadiene in a refinery conversion plant at Texas City, Texas, has been ordered stopped. Preference ratings for the project, which if completed would have cost $1,500,000, were issued Dec. 14, 1942.

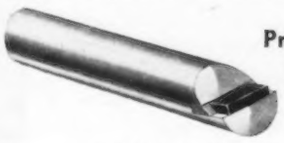
At the same time, WPB revoked preference ratings issued to the Massachusetts Shipbuilding Co., Inc., Boston, for facilities to construct coastwise auxiliary tugs.

Over 300 CARBOLOY STANDARDS* FOR WAR PRODUCTION

(TRADE MARK) ★ CEMENTED CARBIDE

*Standard Stock TOOLS AND BLANKS

Standard stock items are tools and blanks manufactured in mass production, therefore lower priced and more readily available than tools or blanks made to order. Standard tools shown below, in center, can be quickly adapted to meet rush needs by grinding them to special shapes in your tool room.

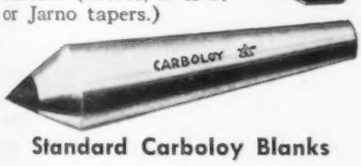


Precision Boring Tools

Two types: (1) carbide tipped (with flat top or back rake) sizes $\frac{5}{16}$" through $\frac{1}{2}$" diameter. (2) solid carbide $\frac{3}{32}$" through $\frac{1}{4}$" diameter.

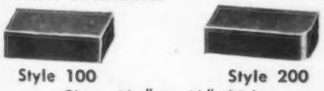
Lathe and Grinder Centers

(Up to 50 times longer life than steel. Available as carbide tips only or finished tipped centers. (Morse, B & S. or Jarno tapers.)



Standard Carboloy Blanks

For emergency tooling, braze Carboloy blanks to your own shanks. Large selection available.



Style 100 — Style 200

Sizes $\frac{1}{16}$" to $\frac{1}{2}$" thick

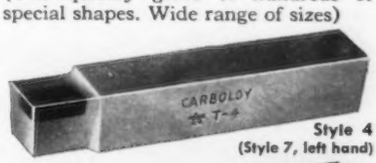
Pointed Nose Blanks — Reamer Blanks — Scraper Blanks

Ammunition Dies

Complete line of standards for drawing .30 and .50 cal. cartridge cases, and 20 mm through 105 mm steel shell. Full line of brass shell dies.

General Purpose Standards for Steel, Cast Iron, Etc.

(You quickly grind to hundreds of special shapes. Wide range of sizes)



Style 4 (Style 7, left hand)

Style 13 (Style 14, left hand)

Style 5 (Style 9, left hand)

Style 10 (Style 11, left hand)

Style 12

Style 1

6 Films Available for Your Plant Training Program

Films show detailed step-by-step procedure on manufacture, design, application and grinding of carbide tools. 35 mm silent slide films (not motion pictures) available at approximate cost of $20 per set of six.

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Drills concrete, brick, etc., 75% faster than old methods. Use in portable electric drills or hand braces. Speeds up installation of wiring, piping, machinery, etc. Sizes $\frac{3}{16}$" to $1\frac{1}{2}$".

Diamond-Impregnated Wheel Dressers

Contains large number of sharp diamond particles permanently embedded in carbide matrix. Eliminates remountings. Saves 25% in annual dresser costs. 3 sizes. For all grinding wheels.

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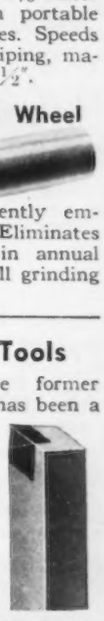
*Standard-Design Tools

Standard-design tools are former "specials" for which there has been a large demand within a narrow range of minor design variation. Standardization now broadly meets most previous requirements. You order by tool number; eliminate time for drafting, blueprints, quotations, etc.



For Roller Turners
On Gisholts and W. S. Lathes

Cut-off Tools
For cutting off to hollow cores such as shells.

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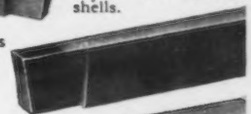
Widths over .060" through .330"



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Primarily for interrupted cuts on large forgings or castings.

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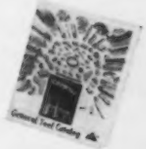

32 page catalog No. GT-142 shows full line of standard-stock and standard-design Carboloy Tools. On request.

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WEST COAST . . . OSGOOD MURDOCK

• Canned food rationing threatens scrap supply for copper precipitation . . . Detinning plants draw from distant areas . . . Outlet seen for low grade country scrap . . . WLB loses feathers in aircraft wage decision.

SAN FRANCISCO—Rationing of canned fruits and vegetables will have repercussions in the production of about eight per cent of the nation's copper output.

That percentage is recovered by the precipitation of copper bearing waters from the dewatering of active and inactive mines and the leaching of mine dumps and overburden. Required for this precipitation is well over 100,000 tons annually of light ferrous scrap, principally shredded tin cans, either detinned or processed. After two weeks in which the sale of canned goods has been restricted, it appears that the supply of cans available will drop off precipitously. More cans are needed this year, and less will be available.

Although the far West has pioneered the detinning of tinned scrap, the matter of securing sufficient cans to meet the requirements of the copper industry always has ranked ahead of any incidental amount of tin which might be recovered by detinning in this section of the country. The recent announcement cancelling projected construction of detinning plants at widely separated metropolitan points confirms the validity of this point of view. Substitution of electrolytic tin plating for hot dip happily has reduced tin requirements substantially, but has not affected the potential sources of scrap for the copper plants.

Detinning operations of Metal & Thermit Corp. in the San Francisco area date back more than 20 years, but prior to the war were confined to detinning of new scrap material received from the can manufacturers. Used cans were shunned both because of difficulties involved in cleaning and because of the high cost of segregation from the catch-all scavenger collections in that area. (See THE IRON AGE "West Coast" March 19, 1942). With the nation apparently facing a critical tin shortage, however, Metal & Thermit stepped into the breach last year with the cooperation of special tin can salvage campaigns sponsored by the Federal government. M. & T.'s process, developed over five years at a cost of $250,000, involves the use of a caustic soda solution for removal of the tin from the cans as do the other processes, but adds accessory efficiencies. About one-third of the detinned scrap required for copper precipitation in Arizona, New Mexico, Nevada and Utah has previously been supplied by M. & T. At Bingham, Utah, a special copper precipitation plant requires 25,000 tons of detinned material obtainable only from M. & T.

In southern California, Los Angeles By-Products Co. operating on a still larger scale, long has taken advantage of the segregated tin can collection in that area. Closer to the copper producing districts than M. & T., Los Angeles By-Products has been in a strategic position to benefit by the industry's demand. This plant processes light scrap without detinning.

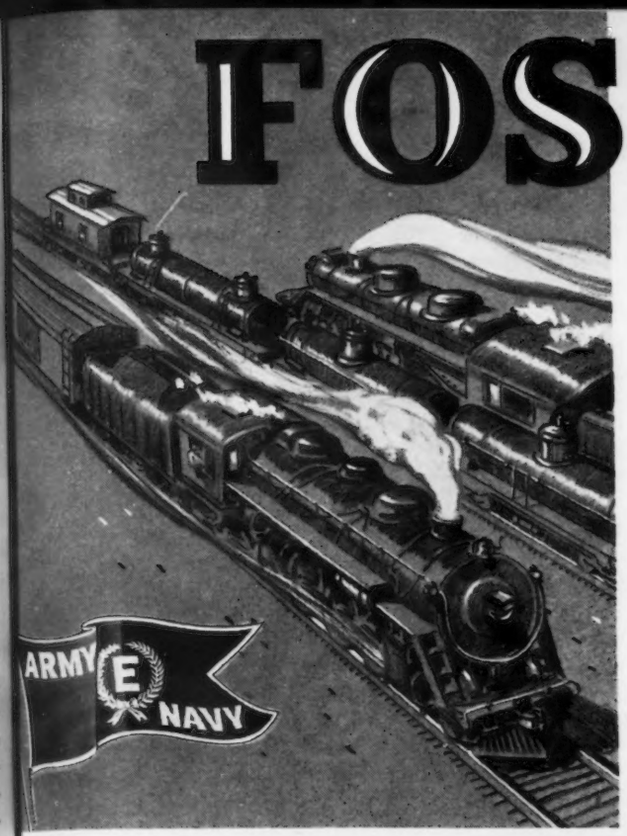
Need for tin and copper has caused shipments of cans to the San Francisco plant from Pacific Northwest centers as far as 1000 miles distant. High freight rates prevailing on this light, loose material means extremely high transportation costs, and since it is classified as steel scrap rather than raw material for copper precipitation, OPA scrap ceilings govern. This all adds up to an extremely low return for the shippers and collectors, so appeals for increased collections must be made entirely on a patriotic basis.

FROM the point of view of the copper industry, shredding plants erected by DPC at Kansas City, Dallas and Houston are as important as the Coast detinning plant. By stripping the cans, and making possible the maximum surface contact with copper bearing waters through shredding, and by permitting two and one-half times as much shredded material to be transported in the space formerly required for unshredded cans, these plants make possible substantial economy. Shredding, of course, is also a prelude to detinning at the detinning plants.

The tin can text book is War Production Board Order M-72-a which provides that tinned scrap shall not go to the steel industry, but to the detinners or direct to the copper industry, wherever geographically practical. Detinned scrap is channeled to the copper industry exclusively. Without this order, incidentally, the country's beverage makers would be unable to purvey their wares, for M-72-a also provides that No. 10 and larger cans may be used for the manufacture of crown caps.

Although inconvenience and inefficiency may be caused by whatever reduction in the can supply is effected by rationing of canned fruits and vegetables, all will not be lost for the copper industry. Long before the use of shredded tin cans was thought of for precipitation, some time during the last war, country scrap was widely used. Light sheet scrap is preferable from the point of view of surface presented in relation to bulk and uniformity, but the basic reaction ($Fe+CuSO_4 \rightarrow FeSO_4+Cu$) remains the same with other ferrous scrap. As a matter of fact, the WPB Salvage Division, which has large quantities of low grade material secured in public drives on its hands in the far West, will no doubt welcome the opportunity to get rid of it. With high grade scrap available, far Western mills have turned up their noses and made various excuses of doubtful plausibility for not taking this material, leaving it in the hands of the government agencies which shouted so hard for a patriotic public to turn it in.

FAILURE of West Coast aircraft unions to bulldoze the War Labor Board into a favorable wage scale by work-delaying 24-hour "meetings" of workers last week brought to a conclusion nine months of bickering of workers, employers, and Federal agencies. The decision, which refused blanket wage increases for workers at the eight southern Califor-



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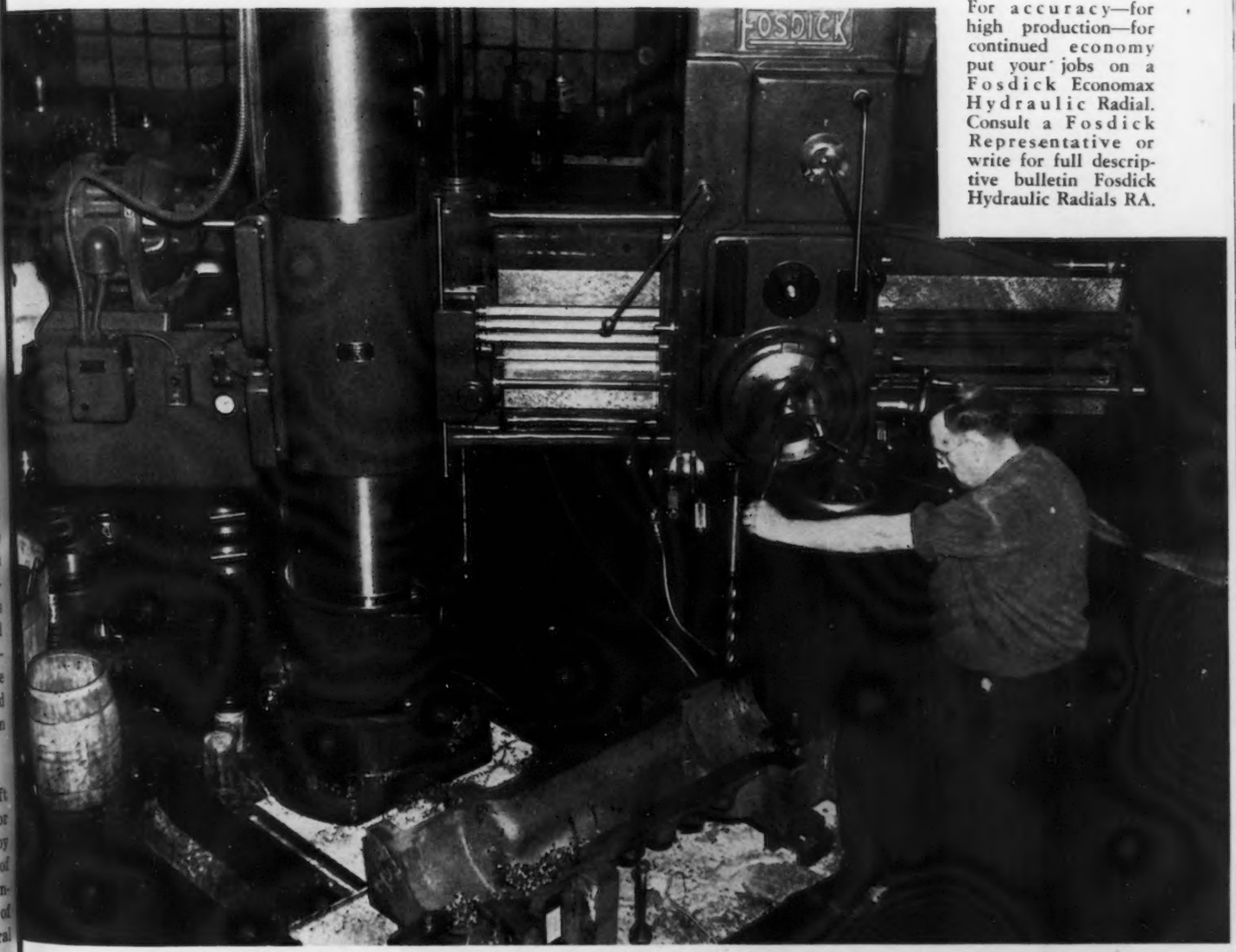
War materials and equipment get the "green light" on all roads leading to our fighting fronts. Transportation by sea, air and rail must be constantly maintained.

Here a Fosdick Hydraulic Radial is drilling and reaming 16—1¼" dia. and 8—1⅛" dia. tapered holes in a locomotive axle housing. These operations in this steel casting are completed at one setting. The wide range of feeds and speeds—versatility of the machine—concentrated controls at the head, for all functions of the machine—all contribute to speeding up production and reducing costs.



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CINCINNATI · · · OHIO

nia major aircraft plants and gave Boeing's Seattle workers only a 4½c. increase, left the unions sputtering, employers somewhat stunned, and the Board itself minus some of its feathers. The majority decision, possibly precipitated by the impatience of the workers, justified itself on the basis of the Little Steel formula, holding that most southern California workers had already had adjustments offsetting the rise in cost of living from Jan. 1, 1941, to May 1, 1942. By standardizing job classifications among the various plants, and reducing the number from 1154 to 291, the decision brought average pay boosts of 7½c. per hour to approximately half the southern California employees.

Unable to reconcile wages paid for unskilled labor in the aircraft industry with those paid by neighboring shipyards, without upsetting the economic apple cart, the Board took the "So What?" attitude, stating "these differentials between aircraft wage rates and shipbuilding wage rates in the lower grades are not unusual or unreasonable differentials amounting to manifest injustice, but are established and stabilized differentials of the kind which should not be disturbed."

THE decision placed employers in the curious position of having offered to make wage increases, but having them vetoed by the WLB. Most employers were silent, but La Motte T. Cohu, general manager of Northrop, voiced a typical reaction.

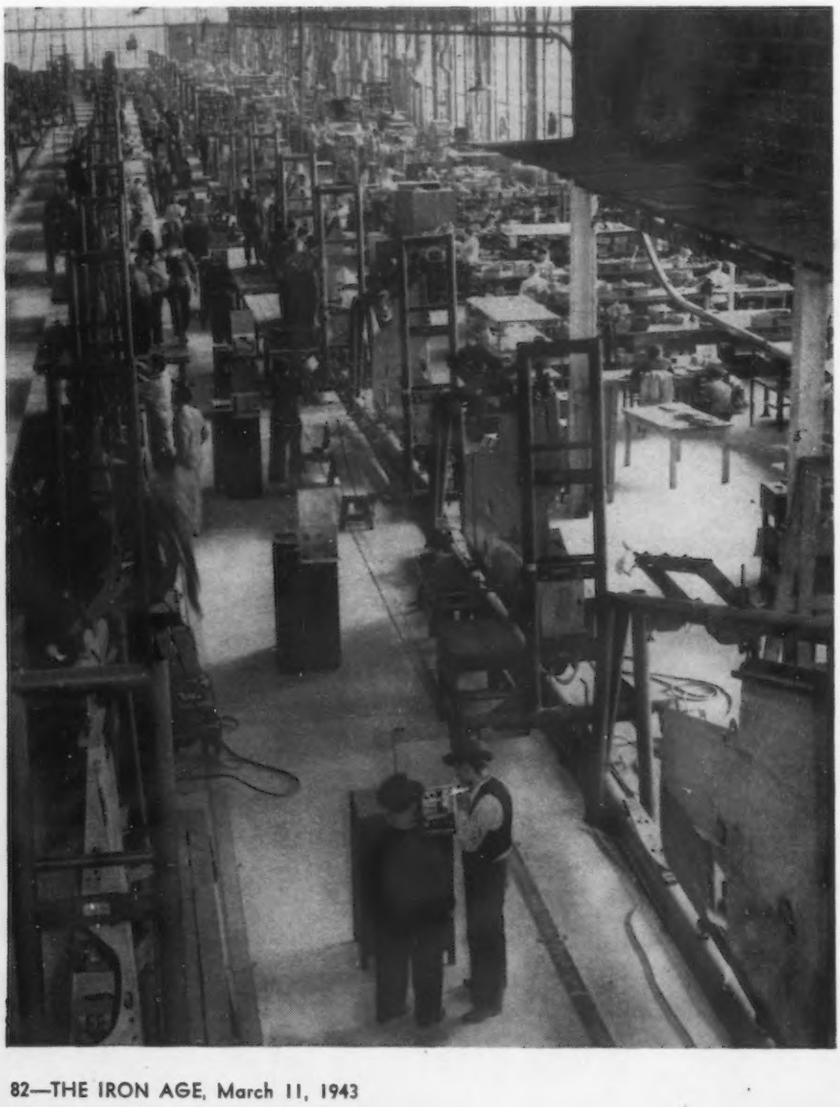
"Our company," he said, "has advocated wage increases commensurate with the rise of living costs ever since last May. Although we did not obtain the full increased wage scale asked for, we realize that the Board must have based its decision on the great danger of inflation to all Americans."

Union officials were not so philosophical. A souped up version of union credo was that voiced prior to the decision by Harvey C. Brown, president of the AFL union at Consolidated Aircraft. He said, "If we aren't strong enough to bring enough pressure to get a fair wage increase, we will be so disintegrated that we will be forced into slave labor and be no better off by winning the war than by losing it." Translated into English, this means that, because the unions have failed to produce promised benefits, future recruiting efforts are likely to be handicapped. This may well be true. Particularly at Douglas, now the target of vigorous organizing efforts by both AFL and CIO, the decision may well tilt the scales sufficiently to keep any organization from gaining enough strength to be recognized as bargaining agent.

The plane output would be cut because of defection of workers and falling off of manpower in the aircraft plants was the further claim of union officials, following a conference after the announcement of the decision. A joint statement by AFL aircraft union heads pointed out that during the past year "a serious labor migration (over 130 per cent turnover on the Pacific Coast in the last year) to higher paying jobs in other war industries," existed.

CIO leaders of the United Automobile Workers were quoted as estimating that the board's order would provide $11,000,000 in bonuses for California aircraft workers and add $300,000 a week to plant payrolls. Although AFL and regional WLB officials felt these estimates were too large, no one denied that there were fairly substantial silver linings to the cloud however black it appeared when it first rolled over.

CONSTRUCTING AIRACOBRA WINGS: Giant master fixtures move steadily forward on power-driven lines at the Bell Aircraft Corp. Bench work and machining are accomplished parallel to the wings and synchronized to their forward motion. About 80 per cent of the work on the wing lines is done by women.



Henry J. Kaiser Plans Fleetwings, Inc., Expansion

• • • **Henry J. Kaiser** has bought the Fleetwings, Inc., Bristol, Pa., a going aviation concern which has two plants and employs more than 5000 persons. The older of the two plants is situated on the Delaware River on the site of a shipyard dating back to the first World War.

The Kaiser company is at work equipping a third plant near Bristol. Fleetwings has been building a two-place basic trainer for the Army.

soldiers who live in Foxholes

better not throw "DUDS"!

Blast 'em, baby — and don't be a dud!"

This may well be the silent prayer of the soldier in a foxhole who throws a hand grenade at the tread of an onrushing enemy tank. To be sure it will explode, the solid cake of pure TNT is well protected from rust and water.

This is why *bonderized* ARMCO ZINCGRIP-PAINTGRIP sheets are used for the base of the new grenade. The extra protection of this bonderized galvanized sheet is needed because ordinary metal might rust when the grenades are shipped or stored in tropical atmospheres.

ARMCO ZINCGRIP-PAINTGRIP fills the bill perfectly. It provides a paint-gripping galvanized surface that *takes* and *preserves* paint (the container is painted inside and out). And it assures a zinc coating that does not flake or peel when the base of the grenade is drawn in a press.

Our fighters use the deadly missile to blow treads off tanks. It is also employed in "sapper" operations, booby traps and other jobs. Threads at the top hold the fuse that is attached when action looms.

We are producing special-purpose metals for Victory products now. But remember, when the war is won ARMCO will have new technical knowledge and new kinds of iron and steel sheets that will help you make better products for America's brighter future. Can you use information now in designing your post-war products? The American Rolling Mill Company, 791 Curtis St., Middletown, Ohio.

ZINCGRIP-PAINTGRIP ★ ARMCO ★ INGOT IRON

THE AMERICAN ROLLING MILL COMPANY

Fatigue Cracks

BY A. H. DIX

They Don't Like Orators

• • • Fairchild Engine's top kick, J. Carlton Ward, Jr., who just got back from a study of British war production methods, says England's output per man is greater than ours because over there every worker is producing as if the outcome of the war depended upon him or her alone.

This does not necessarily mean that the English are more patriotic than we are. The important factor is distance from the enemy. He is never more than 18 miles from England, and frequently is as close as a mile, straight up. Except for submarine visits, about which we hear too little, he is 3000 miles from us.

The strength of an impression made on the mind varies inversely to the square of the distance traveled. The stroke suffered by the old gentleman next door affects us more than the death of a thousand young gentlemen in Tunisia.

To bring the war to our doorstep, the War Department arranges for plant visits by war heroes. These visits invariably boost output substantially for a time, and doubtless there is some lasting benefit. Oddly enough, it is found that the power of the hero as a production stimulator diminishes as his platform manner improves. Production people like their heroes to be not too articulate, a little ill at ease in the public eye, and seemingly anxious to get back to work. The limelight lovers do not carry conviction.

It seems to us that the War Department's experience contains an idea for those who prepare morale-building material for plant bulletin boards and employee publications. A simple enlargement of a letter from a former employee who is now on a battlefront is worth a thousand stock posters in four-colors. And the letter ought to be run without adding in bold type at the bottom, "DON'T LET JOE DOAKES DOWN!" The reader will ingest the message more quickly if no attempt is made to crowd it down his throat.

Stopper

• • • What big ears you have!—*Foote Bros. Gear and Machine Corp.*

Up-and-Down Purist

• • • Even our friend and critic, Oscar T. (Globe-Union, Inc.) Roder, who chides us for our lexicographical sensitiveness, would admire the delicacy of the young man who operates the No. 3 elevator in our building. When one person leaves his car he says, "Watch your step." When two or more leave he says, "Watch your steps."

Dream Aptronym

We thought you might like the following report we received from our automatic burglar and fire alarm protection service company:

"Failing to receive your usual closing signal last night our officer was dispatched to your premises with keys from Station No. 1. He found Mr. J. Padlock on premises."

—*J. L. O'Brien, Treasurer, Economy Engineering Co., Chicago*

Too bad J. Padlock is only a stenographic daydream. We suppose the sentence as dictated read, "He found the missing padlock on premises." We are sorry, too, that Frank Shedwell doesn't make waterproofing compounds instead of working for Acme Steel. And if our Detroit subscriber, Harry Bidwell, does not play bridge we can guess why.

The oddest name we have run across lately is Herman Dabdaub, who found army life olive drab, and left without permission—probably to get back to his painting.

Between Yawns in War Plants

• • • The cropped appearance of your favorite family journal, which began last week, is due to the paper rationing program. Our allotment is 10 per cent less paper than we had in 1942. We don't like the narrower margins, but they are one of war's minor crosses which we must bear.

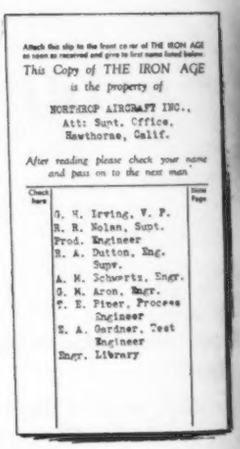
We thought it would be fine if your favorite family journal and others used in war plants could be exempted from the paper cut. "Why not," we reasoned, "let the detective, cowboy, murder, and comic magazines curtail enough to spare the small amount of paper the industrial journals use?" It didn't go over. The pulps, it seems, help keep up morale among soldiers, sailors and civilians.

Although we didn't know it at the time, the pulps are used in war plants. This is from the "Assembly Line," Feb. 18 issue, page 80:

> Length of the work week is not as important as the amount of work put into it. It is no uncommon sight to go through a plant today and see employees sitting in pits beneath production lines, or off to one side, reading magazines or comic books. Such plants simply have too many men for the work being done, and a comic book is a logical means of passing the time of the superfluous employees.
>
> Lengthening the work week will not change the habit of reading comic books while war jobs go forward a few feet away.

How to Save Money and Paper

• • • No Johnny-come-lately in this matter of paper conservation are we. Plant subscribers have always been supplied with routing forms (3 in. by 5½ in.) that enable one copy to do the work of several. If you are getting more than one copy each week and can get along with fewer, send us a list of the names you want printed on the forms, and we will send you a year's supply free.


Attach the slip to the front cover of THE IRON AGE as soon as received and give to first name listed below.

This Copy of THE IRON AGE is the property of

NORTHROP AIRCRAFT INC., Att: Supt. Office, Hawthorne, Calif.

After reading please check your name and pass on to the next man

Check here		Name Plate
	G. H. Irving, V. P.	
	R. R. Nolan, Supt. Prod. Engineer	
	R. A. Dutton, Eng. Supv.	
	A. M. Schwartz, Engr.	
	G. M. Aron, Engr.	
	T. E. Piser, Process Engineer	
	E. A. Gardner, Test Engineer	
	Engr. Library	

No need to wait until the subscription year is up to get the benefit of the saving on the additional copy or copies. Let us know now and we will send you a refund.

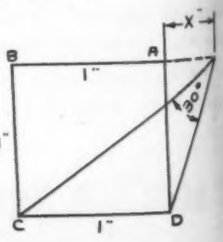
Puzzles

As you saw at a glance, last week's head traveled 37 5/7 ft. more than the feet.

Mrs. P. T. (Southern Bell) Gary and J. M. (Euclid Road Machinery Co.) Pawlechko have sent us beautifully drawn answers to the geometric problem of Apollonius, published here Feb. 11. Thank you both.

The master minds might like to toy with this, sent in by Walter Fisher, Jr., of Bantam Bearings Corp.:

Given: A square with sides that are 1 in., and an angle of 30 deg. whose vertex lies on a line projected from the top of the square and the sides of the angle pass through the base of the square as shown. Problem: To find X from Point A.



Northern SUPER-CRANES

MATERIALS HANDLING CAN'T BE SUBCONTRACTED

If a lathe, shaper, milling machine or other tool breaks down you may be in serious difficulty. But work can be subcontracted —ways found to meet the emergency.

But if a crane breaks down, the shop it serves is tied up until repairs are made. Materials Handling is one job that *can't* be subcontracted. You *have* to have reliable cranes for the heavy load of war production.

NORTHERN USERS HAVE ASSURANCE OF RELIABILITY IN THESE EXCLUSIVE FEATURES:

1. Rigid one-piece welded steel trolley construction.
2. Transmission type single unit, oil tight gear reduction.
3. Easily removable gear case covers. Splash lubrication of gears.
4. Heavy section girders designed for extreme lateral and vertical loads.
5. Heavy duty roller bearings, turned and ground shafts, press fits on ars, wheels, etc.
6. Standard heavy duty anti-friction bearing crane motors—oversize for ere service.
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8. Special heavy duty crane wiring construction to insure safety and minate wiring troubles.
9. Unit bridge drive mechanism combined with heavy welded steel end ks.
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Dear Editor:

HARD WORKERS

Sir:

My heart is broken by the letter from the man who "hasn't taken a day off since Christmas" (Feb. 25 issue, page 28). Did he say what year? If he means 1942, it's only eight weeks.

I'd like him to meet my uncle, who worked as a stationary engineer for fifteen years, during which he had exactly one day off, to bury his wife. He worked twelve hours a day, seven days a week. He quit this job at the age of 71 because he lost his sight.

I'd also like him to meet my father, who, at the age of 71, frequently puts in 16 to 20 hours a day, as much as half of which may be on foot, in whatever weather prevails.

I'd like to meet him, myself. I'm just a mollycoddle, but before gasoline was rationed I went to Pittsburgh once a month—did a day's work in New York, drove all night, did a day's work in Pittsburgh, drove all night back again and did a day's work here. It was only office work, but after all it was eighty hours straight, broken only by an odd two or three hours of sleep that I might catch.

I do not doubt that Mr. Kean's friends all work as steadily as he says, but on the other hand, one of my friends told me this morning that his best machinist has taken Monday off for the last twenty years—works four days a week. And night before last another told me that his two best hand scrapers, engaged in the vitally important work of reconditioning machine tools for war plants, cannot even be found from Friday night to Tuesday morning. If you call on plant managers for other instances, they will snow Mr. Kean under.

The point is that Mr. Kean is being compensated for his work infinitely better than any of the people I have mentioned, including me, and it ill becomes him to throw rocks at people who are trying to keep their businesses, homes and families going.

W. A.

Noroton Heights, Conn.

• A stationary engineer might work 16 hours a day and thrive on it, but it would kill a catcher on a rod mill. Comparisons of hours worked per week are idle unless variations in physical (and mental) demands are considered.—Ed.

METAL SPRAYING

Sir:

In the Feb. 18 "Dear Editor" page, Claremould Plastics Corp. wanted to know who manufactures equipment for spraying metals.

The Alloy-Sprayer, manufactured by us, seems to have certain definite advantages—for lower temperatures, such as below 600°F—among which is the fact that the operation need not be on a high production basis.

The softer babbitt type metals cannot be easily held in proper shapes after drawing, scrap alloys cannot be re-used, all of which can be done with the Alloy-Sprayer.

ALFRED B. HARD

Alloy-Sprayer Co.,
2040 Book Bldg.,
Detroit, Mich.

Sir:

In answering the Claremould Plastics Corp. inquiry, you mentioned the Metallizing Engineering Co., and the Metals Coating Co. of America. Surely you must know of the Metallizing Co. of America. We are the oldest metallizing equipment manufacturers in the United States, having manufactured the Mogul Metallizing equipment for the past twenty years.

E. T. PARKINSON

Metallizing Co. of America,
1330 West Congress St.,
Chicago, Ill.

SPEED OF SOUND PHENOMENON

Sir:

On your "Dear Editor" page in the issue of Feb. 11, the editor stated that the pilot of a hypothetical pusher-type plane traveling at the speed of sound could hear the noise of the engine. I think that we could all agree that he could hear the engine through the frame of the plane itself and through pockets of air driven forward by the plane (even if the speed of the air pockets were only a fraction of the speed of the plane).

However, if these two possibilities are ruled out, it seems that the engine would be inaudible. The sound waves travel at the maximum speed possible *relative to the air medium itself.* The pilot is traveling at this same speed, and, being in a pusher plane, he has a head start. Therefore, the sound waves would never catch up with him.

Is it possible that the editor had in mind some of the experiments with the speed of light, measured in different directions? The problems are not comparable because it is possible to measure the speed of a body relative to air, the medium of sound waves; but it is impossible to measure the speed of a body relative to the medium of light waves (shall we call it ether?).

H. BURKE HORTON,
Economist

Natl. Resources Planning Board,
Washington, D. C.

• Our Feb. 11 answer was an excellent example of careless thinking. Only in a completely enclosed plane would the air body between the pilot and the engine be traveling at the speed of the plane. Otherwise, excluding a multitude of variables, such as temperature and pressure, and considering the air body as comparatively stable, with both pilot and engine passing through it at the same speed (on the order of 741 miles per hour) the pilot would never hear the sound of the engine by air-transmitted waves.—Ed.

BURN REMEDY

Sir:

An article in the Feb. 11 issue of THE IRON AGE, page 69, describes the treatment of industrial burns with Hexene-ol. The local drug houses have no information on this remedy, and it may be that it has not gone beyond the hospital use. The article aroused interest in our shops, and we would appreciate any information you can give us as to the supplier of this product.

ANNA F. FREY,
Librarian

Western Precipitation Corp.,
1016 West Ninth St.,
Los Angeles, Cal.

• Write to Dr. Benjamin Levine, Mt. Sinai Hospital, Cleveland.—Ed.

BESSEMER VS. OPEN HEARTH

Sir:

We are asked by the WPB to use 25 to 30 per cent Bessemer steel in our construction. We have always used open hearth and would appreciate information as to where Bssemer fails to come up to the quality of open hearth.

We use soft steel in bars, angles and channels. We punch, thread, drill, forge, bend and twist and weld.

L. B. McADAM

McAdam & Sons,
Barker, N. Y.

• Generally speaking, Bessemer steel can be fully as satisfactory for many uses you probably have in mind as open hearth. For general information on new applications into which the greater output of Bessemer steel is flowing, see page 96 of the March 4 issue. Much of the reluctance in the past to use Bessemer steel is based on misinformation. There are many applications in which it could be fully as satisfactory as open hearth steel which is more expensive to make. —Ed.

TOOL STEEL DIRECTORY

Sir:

A steel company representative showed us a copy of your "Directory of Tool Steels" and mentioned how useful it had been to him as a constant practical reference. We would appreciate your sending us a copy for use in our gage manufacturing laboratory.

CARL S. CASTO,
Major, C. W. S.

Headquarters Edgewood Arsenal,
Maryland

EXPERTS *not required!*

You can train inexperienced men or women in a comparatively short time to obtain quantity and quality production on Monarch lathes without undue fatigue. This is because Monarch engineers have always considered *simplicity of operation* to be a basic factor of design.

Such characteristics as simplified control of speeds and feeds and thread chasing . . . ease of mounting plates, chucks or fixtures on spindle . . . automatic lubrication of all major units . . . large diameter, direct reading micrometer dials and other features remove the strain of learning, shorten training periods and result in more rapid progress toward quality production.

With this background, operators can take quick advantage of Monarch production lathes, toolmakers' lathes, Monarch-Keller automatic forming turning machines and Monarch automatic sizing lathes, all of which are doing important war work in plants throughout the world.

With the pressure on all of us to produce "faster for fighters", we suggest that you review the versatility of Monarch lathes and the wide variety of work which they can do in your plant as they are doing so successfully in other plants. If our engineers can help you, they are at your service.

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MONARCH LATHES

COVER THE TURNING FIELD

This Industrial Week . . .

- ***Aircraft Steel Mess May Be Bettered***
- ***Steel Industry Orders Much Heavier***
- ***Swing to CMP Creating Confusion***
- ***Ingot Output Still at 100 Per Cent***

THE all-out effort to eliminate critical shortages of aircraft steel (first reported Feb. 18 on these pages) holds promise of succeeding. At least two months recently have been clipped off the time required from the start of raw materials for aircraft until the finished plane flies away.

Lack of co-ordinated planning in alloy steel distribution, shortsighted ordering practices by the aircraft industry, plus paper confusion have created the numerous temporary shortages of aircraft steel. Through tighter inventory controls, the pooling of small orders, the adequate stocking of 26 strategically located warehouses, the use of reserve tonnages and the elimination of some red tape, plus other steps, it is hoped that the mess may be straightened out. If all goes well about 95 per cent of all aircraft steel melting schedules will be fixed firmly by the first of each month, with the remainder left open for Aircraft Scheduling Unit emergency orders.

Increased use of open hearth alloy steel instead of electric furnace grades is being urged upon the Air Forces. Inventories of processed alloy steel parts which are said to be high at some factories are being surveyed. Meanwhile, shortages of alloy steel are forcing more and more substitutions in fields other than aircraft. The tank-automotive center at Detroit, for example, has devised a system to expedite substitutions when a manufacturer finds it impossible to obtain the desired alloy steel. Examination of captured German tanks shows that the Nazis also have been making many substitutions and using armor which consists simply of heat-treated carbon steels.

IN the steel industry this week, orders are much heavier with railroad car and locomotive builders placing commitments and users of plate and alloy rounds specifying freely.

Recent Lend-Lease statistics which show that up to Feb. 1 about 580,000 tons of steel had been shipped to Russia with heavy tonnages of other items, do not tell the entire story of the steel industry's great effort to assist the Soviet. Early last year, mills were forced to shunt aside important domestic orders to get out about 130,000 tons of pipe for Russia in odd sizes. Not all of it was shipped, however, and about 89,000 tons are still in this country waiting a buyer through the Metals Reserve Co. Disposal may be difficult. The case is reminiscent of a large tonnage of galvanized sheets for China which still remain in this country.

A belated step to improve the farm equipment situation was taken over the weekend, when quotas were boosted. While farm production has increased over the years and population has gained, the volume of steel going to the agriculture industry in 1940, 1941 and 1942 was significantly below the average for the years 1935 to 1939, declining last year 35½ per cent below that average. Even the small amount of new equipment available in recent months has been distributed poorly.

Meanwhile, the rationing of canned fruits and vegetables may reduce by about 8 per cent the nation's copper output. Shredded tin cans are used in the precipitation of copper bearing waters.

STEELMAKING facilities brought into operation during the latter half of 1942 have added 269,330 tons to Pittsburgh's open hearth capacity and 93,860 tons to its electric furnace capacity. Chicago, second largest steel producing district, made the largest tonnage gains, 403,000 tons of additional open hearth and 170,140 tons of electric furnace capacity. Canton-Massillon, first with respect to electric steel, added facilities for 32,080 additional tons. Open hearth capacity in the Youngstown district has increased by 115,400 tons. Open hearth and electric steel capacity in the Cincinnati area has decreased by 34,010 and 2500 tons respectively, putting that district down one notch to 11th place.

The three main centers retain their respective positions as far as total ingot output is concerned with Pittsburgh first, accounting for 22.75 per cent of national capacity; Chicago, second, representing almost 20 per cent, and the Youngstown area third with 14 per cent.

With allotment numbers and delivery orders without allotment numbers steadily increasing as steel users swing over to the Controlled Materials Plan, confusion has been created in some divisions of the steel industry. The allotment numbers take precedence over ordinary priority ratings.

Alloy steel sellers report that certain customers

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have allotment numbers for April but cannot be placed on mill schedules for April as schedules are closed. Schedule makers are perplexed by the lack of allotments from consumers known to be vital to the war efforts.

AFTER eight weeks of working on allotments and waiting for them to come back, a few war producers have been disappointed in the tonnage granted them. "Shopping around" to get desired deliveries is another strain for war goods producers.

Steel companies have no way of knowing whether an order under CMP represents the total three months' tonnage allowed customers or just one-third of it.

A factor which may create new confusion temporarily is the increased demand for replacement parts, primarily for the Air Corps and the Ordnance Department. With greater United States participation on battlefronts, normal expectancies of parts are changing.

In some industrial quarters, complaints against CMP have been growing steadily. Other authorities hold that the plan should be given a longer trial before it is condemned completely.

One fact seems to stand out—consumers who have spent time studying CMP and learning how to operate efficiently under it, are in an advantageous position now. The load is on the buyer. Consumers who have not been following CMP regulations may be at a disadvantage temporarily and there may be some loud complaints.

STEEL ingot production for the nation this week continues at 100 per cent of capacity. Operations at Youngstown have gained a full point to 102 per cent. Philadelphia output is up half a point to 93 per cent as is Buffalo at 106.5 per cent. The two large steel producing centers, Pittsburgh and Chicago, are working at last week's rate of 101.5 per cent and 101 per cent respectively. Down a point to 96.5 per cent is the melting rate at Cleveland while Detroit operations have declined one and a half points to 104.5 per cent. Steelmaking at Cincinnati has dropped five points to 100 per cent and at St. Louis ingot output is off three and a half points to 101.5 per cent. The small Eastern district this week is operating at 90 per cent of capacity, 22 points below its last week's level.

Only the shortness of the month prevented the steel industry from making February the second biggest month on record for steel output, according to the American Iron & Steel Institute. Production of 6,881,882 tons in February was below the January total of 7,408,744 tons, but was substantially above February a year ago when 6,521,056 tons were produced.

Russia Given 580,000 Tons of Steel

Washington

• • • United States Lend-Lease shipments to Russia up to Feb. 1 amounted to more than 580,000 tons of steel, 46,000 tons of aluminum and duraluminum, 21,500 tons of zinc, 94,000 tons of copper and brass and other industrial materials such as nickel and molybdenum for Soviet factories making planes, tanks and other war equipment. These shipments along with others, including many thousands of planes, tanks and guns sent to Russia were made public by Lend-Lease Administrator E. R. Stettinius, Jr. Other shipments listed were 50,000 tons of toluol and TNT; 75,000 tons of rails; 17,000 tons of other railroad equipment; 72,500 trucks, 17,500 jeeps and armored cars; 7700 motorcycles; 1300 military tractors; 140,000 field telephones; hundreds of thousands of miles of field telephone wire and 268,000 tons of petroleum products.

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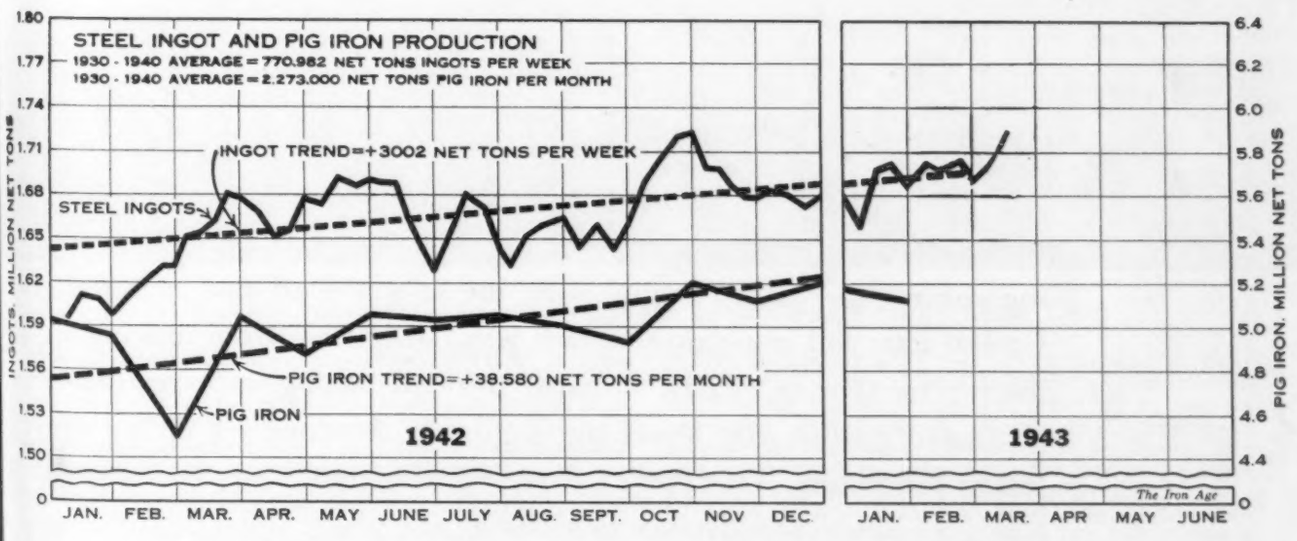

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S. Ohio Rive	St. Louis	East	Aggregate
March 4	101.5	101.0	101.0	92.5	97.5*	106.0	88.0	102.0	106.0	102.0	105.0	104.0	112.0	100.0
March 11	101.5	101.0	102.0	93.0	96.5	106.5	88.0	102.0	104.5	102.0	100.0	101.5	90.0	100.0

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ARMY E NAVY

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Carbon • Stainless • Stainless-Clad (Silver-Ply)

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ESTABLISHED 1901

What's back of the farm implement muddle . . . a real steel shortage . . . maldistribution . . . too many bureaus? This roundup of facts by THE IRON AGE *gets at the inside story.*

Farm Tool Quotas Given Boost; Problem Long Neglected

Pittsburgh

• • • **Belatedly,** quotas for farm machinery production were amended last Saturday, nearly doubling the amount of equipment allowed under Order L-170, issued last October.

The action is welcomed by equipment makers as a step toward averting a possible food shortage. The individual initiative and independence of the average American farmer probably will be the biggest factors if the nation overcomes the present food threat.

At present controversy is raging over the manpower situation and the lack of farm implements. Even though the latter would be provided for to a much greater extent, the chances are that due to direct war requirements, priorities, etc., any increase in the number of implements probably would not reach the farmer until this fall or later, at least in sufficient number to do much good.

There are many farm implements

British Farm Equipment Program Sharply Different Than Ours

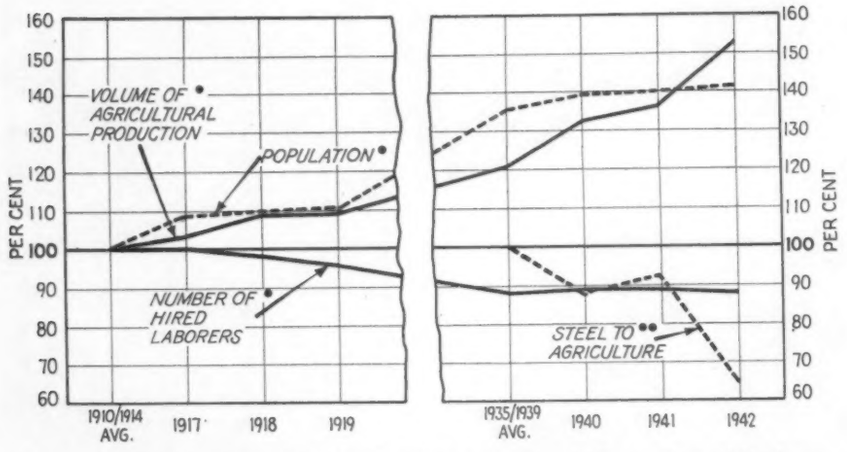
• • • Great Britain's farm mechanization program stands out in sharp contrast to the situation in the United States, according to a prominent British agriculture official who on a recent visit to New York was interviewed by THE IRON AGE. Great Britain is producing 100 per cent more food than in 1939 and is cultivating 50 per cent more land, despite manpower shortages. The number of tractors on British farms has been increased from 53,000 in 1940 to about 130,000.

When war broke out, tractor plants in Great Britain prepared to convert to war production, but soon received government contracts for all the tractors possible. Last August 2432 tractors were built, an all-time record. Imports from the United States were 9000 in 1941.

Quality of British made tractors, say well informed sources, has not deteriorated during the war. The same grades of steel as were used before the war, or comparable grades, are still used. It is believed that tractors built during the war years will stand up as well as previously made machines. Almost all English made tractors are Fordsons, manufactured by Ford. The only other important company in the field is the much smaller David Brown firm at Huddersfield.

Last year British farmers spent about $75,000,000 for mechanical equipment. Fewer than 100 combines were in operation at the start of war, against an estimated 3000 at the present time.

Every tractor owner is encouraged to keep the machine operating as much as possible. Night plowing, with screened headlamps, has been pushed. Some tractors carry two tanks, one for gasoline for starting purposes and the other for paraffin.



• • • The Department of Agriculture's own figures indicate that while farm production in 1942 had climbed 53½ per cent above the 1910 to 1914 level, population had increased to 41½ per cent above that base period. Other facts, such as increase in the size of the armed forces, plus Lend-Lease shipments, would seem to indicate that the slight edge of 12 per cent between the population increase and farm production in 1942, was slight indeed, and probably did not exist. Possibly portending what we are running into in the future is the fact that the number of hired laborers on the farms in 1942 was 12½ per cent below the average base period of 1910 to 1914. This would not be so discouraging if figures indicated a steady rise in the amount of steel going to the agricultural industry in the form of materials, repair parts, and farm implements since 1939. Actually, the volume of steel going to the agriculture industry during 1940, 1941, and 1942 was significantly below the average for the years 1935 to 1939. With both labor and steel to the agricultural industry declining, it is hard to see where the means will be obtained to produce an ever-increasing farm volume of production.

which have not been put to use because of a mixup in the quota or distribution problem. The Department of Agriculture is trying to tell each farm implement manufacturer in which county each machine must be sold in order to get some kind of equal distribution from the small manufacturers.

According to reliable information, the Department of Agriculture is not paying much attention to sizes or types of implements, with the result that instructions have been given to ship small row crop tractors to the wheatlands of Nebraska. Orders have been sent out to ship hammermills made for chicken raisers into the corn belt and Rocky Mountain states where large mills are needed. Other instances have occurred where equipment made for California conditions has been ordered sent into the Southeast where it is doubtful whether the farmers have the money to buy or the power to pull them.

Merchandizers have spent much time attempting to correct Washington on these maldistributions. Some of these authorities believe that probably not more than one-half of the machines which are supposed to be distributed to farmers ever reach the part of the country in which they are designed to work. It is doubtful whether some territories into which shipments of farm implements are made are equipped with information about the machine or have available repair parts stocks.

While official sources have been playing down the lack of steel to farm implement companies and the maldistribution of completed farm implements, much fanfare has been placed upon the substantial increase in farm production during 1942. Official Department of Agriculture figures indicate that the volume of agricultural production in 1942 was 53½ per cent above the average in the years 1910 to 1914. On the surface, this looks like a substantial showing. However, by plotting the population of the country with the average of 1910 to 1914 as a base, the population has increased up to January, 1942, 41.5 per cent. This means that the showing in agricultural production is only about 12 per cent more than would be expected from a country that was enjoying a fairly decent standard of living. Further analysis, however, indicates that with the armed forces increasing rapidly in number, with the average soldier eating more than at home, and with lend-lease shipments taking part of total farm production, 1942 farm output is far from significant.

Possibly more foreboding is the Department of Agriculture's own figures on the number of hired laborers, which it admits involves a greater employment of children, women, and older people. For 1942, the index of hired labor (this does not include skilled farm workers) with 1910 to 1914 as a base stood at 87.5, or 12½ per cent below the base period.

What is more revealing is the amount of steel consumed by the agricultural industry over recent years. One would expect in a period of high farm productivity either an increase in farm equipment and implements with a possible decrease in labor, or at least an increase in labor if farm equipment volume remained stationary or was reduced. Using THE IRON AGE returns on the amount of steel shipped to the agricultural industry in 1935 to 1939 as 100, shipments in 1940 dropped 11½ per cent. In 1941, steel to the agricultural industry was 7½ per cent below the average shipments in the years 1935 to 1939. It is not to be inferred that the average yearly shipments in the years 1935 to 1939 were any great shakes and they definitely did not represent high points. Nevertheless, in 1942 it is estimated that because of WPB restrictions and Washington's failure to realize the importance of food in the war picture, steel shipments to the agricultural industry declined 35½ per cent below the average of the years 1935 to 1939.

One does not have to listen to the dire pronouncements of farmers or their friends to realize the serious situation with regard to food supplies. It should be obvious that with agricultural production increasing only a small per cent above the increase in population, while at the same time the supply of labor and the supply of steel for fences, buildings, repairs, and farm implements is declining, the "wildest critics" of the farm problem have much in their favor.

Although some measure of relief has been given to farm implement

Farmers Bid High for Scarce Materials

• • • Reflecting the tightness of some farm materials, barbed wire which sells at $3.25 a roll was sold recently at farm auctions before ceilings were clamped on it, at prices ranging from $7 to $12.50 a roll. Second-hand farm machinery at a recent farm auction found eight prospective buyers bidding the ceiling price. A drawing was held to determine the purchaser.

manufacturers, this has been obtained only through terrific pressure and consistent warnings, and even now the WPB cannot necessarily promise that its relaxations will be anything more than temporary. The supplying of more steel to the farm implement industry does not necessarily mean that the manufacture of machines will be expedited to a point where this year's crop shortages can be minimized. With the distribution of completed farm implements almost reaching a hopeless situation, it is idle, according to farm authorities, to talk about new implements, except in that they may prevent an even more serious situation in 1944.

Some authorities are arguing that before the farm problem is settled, and after some of the tumult and shouting dies, this country may have to adopt the British system of farming. Large and rich farms in the United States are producing about all that can be produced. The margin for increased production in this country, it is said, lies within the expansion of production on the smaller and, one might say, poorer farms. It is advocated by some that small companies be formed with an owner and several mechanics which would own a complete line of the more important mechanized farm implements. This specialized group with heavy equipment and machines capable of greater production, should move from one farm area to another and do the more important harvesting jobs.

What Farmers Want

• • • It's been several years since THE IRON AGE presented a first-class analysis like this of the farm equipment industry. Obviously, the position of the industry is particularly newsworthy now. This article, like others in recent weeks was written after discussions with foremost industrial and governmental authorities, and double-checked for the accuracy of certain statements.

Certain authorities at Washington contend that the farm equipment industry ought to be building short-life equipment, using secondary steel and substitutes. Farm authorities, however, say they want heavier equipment for bigger agricultural operations.

As in the steel expansion program, and other programs which are retarded or have been shunted aside by direct war requirements, the farm implement picture, as well as the farm material picture, has been held back by poor initial planning, the weakness of the priority system, the tendency to find a goat instead of a solution, and the almost universal failure to realize that an army moves on its stomach.

The increase in farm machinery production announced last Saturday was made possible by the recent action of the Requirements Committee of the WPB which allotted additional critical materials for the manufacture of farm machinery during the second quarter of 1943.

The present amended order shows the percentage of increase authorized for 166 items out of the 312 listed in Schedule A attached to the order. Among other changes made by the present amended order are the following:

Producers who before today have been authorized by appeal or otherwise to manufacture additional quantities of any item increased by this amendment must deduct such previously authorized quantities from the increased quotas.

Producers granted increases must certify to WPB their intention to manufacture their entire quota, including the increases. In cases where the producer will not be able to manufacture his full quota, he must notify WPB, and that part of the quota which he cannot manufacture will be placed with another producer.

The expiration date of the entire order L-170 is changed from Oct. 31, 1943, to Sept. 30, 1943.

Water storage tanks (item 218 in Schedule A of the original order) were eliminated from Schedule A of L-170 as amended Feb. 12, 1943. They are now specifically excluded from the definition of "farm machinery and equipment." This frees water storage tanks from all limitations of L-170 as amended.

Steel Capacity Gains Analyzed by Specific Districts

• • • Since Hitler's promise of peace to Poland's population in the late summer of 1939, the United States has added over nine million tons to its annual steelmaking capacity. The two years of greatest expansion were 1940 and 1941 when capacity was increased by 3,201,099 and 4,417,970 tons, respectively. During the past year, facilities for melting 1,073,340 more tons of steel have been constructed.

The exacting demands of war have caused an overwhelming increase in electric furnace capacity which has swelled by 187.5 per cent since 1940, from 1,592,080 tons three years ago to 4,554,980 tons at present. The past year's electric furnace additions accounted for 329,090 tons of new capacity with the Chicago district having gained the lion's share of 170,140 tons. Pittsburgh followed with an increase of 93,860 tons and Youngstown, still the largest producer of electric steel, added 32,080 tons a year. The remainder was divided among Detroit, the biggest percentage gainer, having raised its capacity 24,750 tons; the Western district with 10,400 tons and Buffalo, 2700 tons. Electric furnace capacity at Cleveland, Cincinnati and Birmingham has declined by 100 tons in the case of the

Steelmaking and Blast Furnace Capacity by Districts—as of Jan. 1, 1943

District	Open Hearth 87.0%	Bessemer 7.3%	Electric and Crucible 5.0%	Total 100%	Pig Iron	Ferro-Alloys	Total
Pittsburgh	17,662,350	2,150,000	73,960	26,544,310	14,477,400	309,200	14,786,600
Chicago	16,452,600	830,000	732,100	18,014,700	12,654,510	.....	12,654,510
Youngstown	9,444,470	1,724,000	1,620,680	12,789,150	7,534,240	.....	7,534,240
Philadelphia	10,321,040	240,000	424,430	10,985,470	6,071,690	206,980	6,278,670
Cleveland	3,940,000	594,000	6,900	4,540,900	4,908,100	.....	4,908,100
Buffalo	4,362,950	.....	79,600	4,442,550	4,440,000	.....	4,440,000
Wheeling	2,999,120	1,015,000	.....	4,014,120	2,902,320	.....	2,902,320
Southern	3,577,000	.....	107,600	3,684,600	4,176,940	188,120	4,365,060
Detroit	2,792,600	.....	366,990	3,159,590	1,604,000	.....	1,604,000
Western	2,612,530	.....	208,020	2,820,550	1,566,100	.....	1,566,100
S. Ohio River	2,743,180	.....	40,000	2,783,180	1,754,600	.....	1,754,600
St. Louis	1,658,770	.....	.....	1,658,770	427,030	.....	427,030
Eastern	614,270	.....	240,500	854,770	411,400	.....	411,400
TOTAL	79,180,880	6,553,000	4,558,780	90,292,660	63,033,330	793,000	63,826,330

first and about 2500 tons for the latter two districts. As the steel expansion program approaches its goal of 96,000,000 tons of annual capacity, the electric steel industry will no doubt leap still farther ahead of its present position and certainly as it has its past.

Open hearths, still the rabbit in the race, now account for seven-eighths of all steel capacity, although three years ago over 90 per cent of capacity was that of the open hearth. Additions, enlargements and the use of more pig iron in the heat has upped its capacity at the beginning of this year by 933,650 tons. The Chicago area again came up on top with an annual increment of 403,000 tons. Pittsburgh, again runner-up can produce 269,330 more tons a year than in July, 1942. Coming in third was Youngstown with its new capacity of 115,400 additional tons. The Western district gained 92,940 tons of open hearth capacity and Cleveland added 50,000 tons. For the small Eastern district its tonnage increase of 33,170 put it in the lead as far as percentage gained, 5.7 per cent over its capacity in July, 1942. In and around Birmingham, open hearths can now melt 3000 extra tons while in Philadelphia and St. Louis only 500 and 320 additional tons a year can be cared for. Cincinnati has lost facilities to make 34,010 tons of steel annually, thereby giving up its position as tenth district steel producer to the Western district.

The capacity picture concerning bessemer steel is similar to the blue ribbon painting at an art show which was turned right side up only after the judges had awarded the prize and then returned to its original inversion by a conscientious caretaker. In 1940, 543,080 tons of new capacity were added. A year later capacity was decreased by 443,520 tons and last year another 168,400 tons were subtracted. Plans for new converters as part of the steel expansion program were made but later suspended as equipment was considered more essential elsewhere. Only at Wheeling was bessemer capacity increased. At Chicago and Pittsburgh, 100,000 and 147,700 tons of capacity were removed.

For a detailed discussion of the present position of bessemer steel, see THE IRON AGE, *March 4, 1943, p. 95.*

To support the production of 90,292,660 tons of steel a year, blast furnace capacity was expanded 3,116,410 tons to 63,826,330 tons annually. Ferroalloy capacity climbed to 793,000 tons from 734,170 nine months ago.

Dividing the honors for the largest tonnage increase, 743,300 tons, for the Western district are the new units of the Henry J. Kaiser Co. and the Columbia Steel Co. at Provo, Utah. Youngstown gained 649,440 tons to its pig iron capacity, Republic Steel Corp.'s new furnace in that district accounting for a little more than half the increase. Enlargements of several other furnaces absorbed the remainder.

The completion of the Bethlehem Steel Co. project at Bethlehem, Pa., and the restoration of a furnace at Chester, Pa., by the Pittsburgh Ferromanganese Co. have added 487,000 tons to the Philadelphia production capacity. Bethlehem's Lackawanna

ACP Products and Processes

"Go to a Soldier's Head"

Millions of steel helmets owe the durability of their protective coating to DEOXIDINE. This acid-cleaner that made the all-steel automobile body possible removes oil and rust, eradicates rust-producers, and leaves an etched, passive surface that holds paint perfectly. It not only improves paint life, but simplifies processing.

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ACP Products and Processes . . . proved for more than 25 years . . . are helping Industry convert to production of many vital tools of war.

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The following list is only an indication of the operations in which ACP can aid you:

RODINE—pickling inhibitor that saves steel and acid, prevents acid fumes and embrittlement. CUPRODINE—provides dense, bright copper coatings on steel by simple immersion (non-electrolytic). LITHOFORM—coats galvanized iron to hold paint. FLOSOL—an exceptional soldering flux for steel, brass, copper, tin, terne plate, zinc and galvanized iron. KEMICK—paint that holds to and protects metal surfaces subject to red heat.

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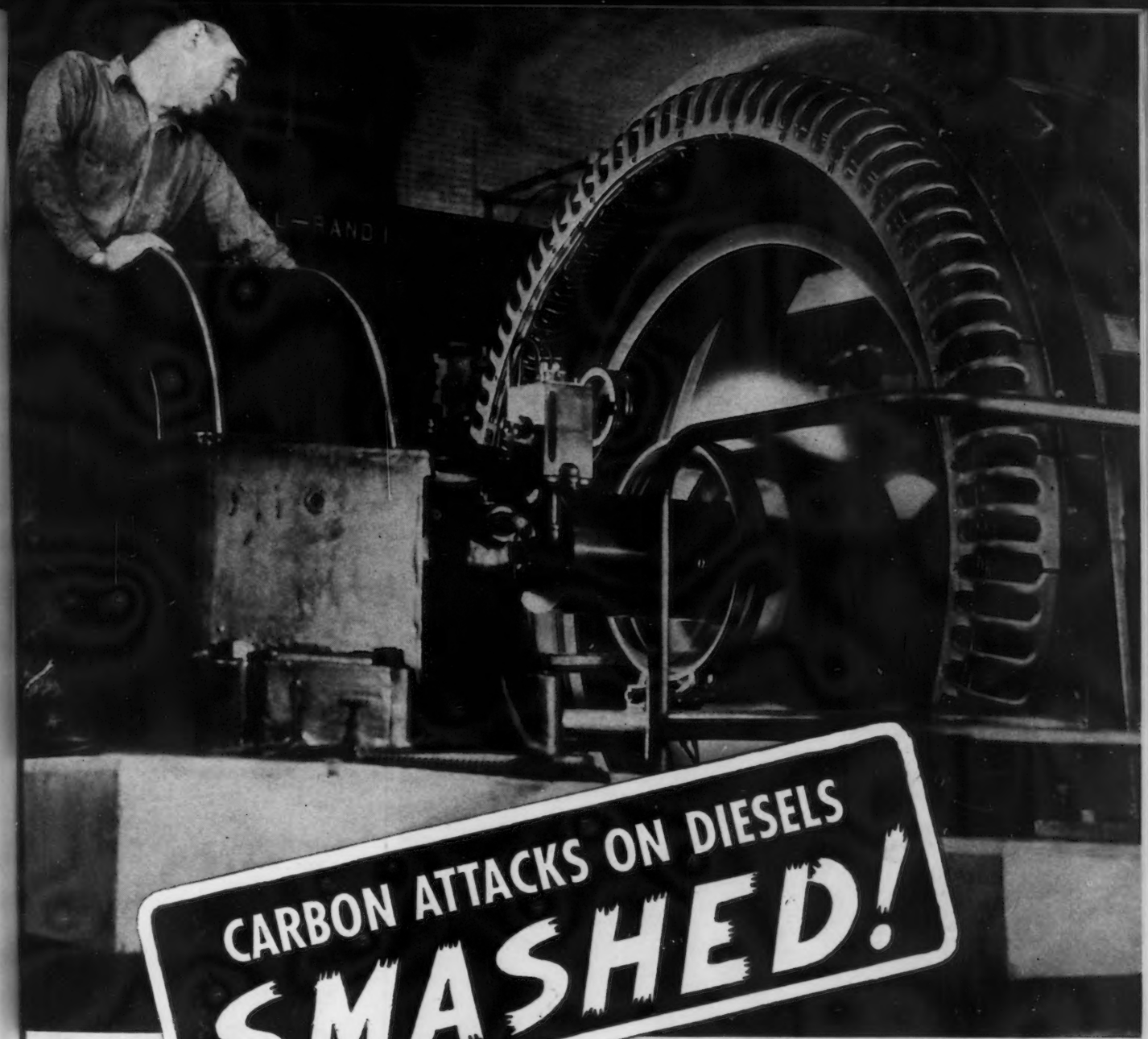

SOLNUS OILS

"Solve carbon problem . . . eliminate fire hazard"

For 10 years the generator-connected diesels in a large plant manufacturing electrical controls were plagued with carbon. Numerous high-grade lubricants were tried—all resulting in the same trouble. Carbon accumulated to such a point that forced shutdowns occurred on an average of once every 60 to 90 days, causing serious trouble and power losses.

Then a Sun Oil Engineer—a diesel lubrication expert—recommended Solnus Oils. They solved the carbon problem . . . stopped numerous shutdowns and fire hazards . . . ended costly power interruptions.

Solnus Oils are scientifically-developed to give "top-notch" performance . . . to keep your present equipment running smoothly, trouble-free. These modern diesel oils are wholly distilled, low in carbon content, neutral in acidity, and can stand up and take it.

Call on the service of Sun Oil Engineers—those capable Doctors of Industry. Let them show you how to keep your engines at peak efficiency . . . to produce unfailing power for victory production.

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unit has increased pig iron capacity in the Buffalo district 360,000 tons a year. Although Cincinnati's steelmaking capacity has dropped off this year, its ability to make pig iron has jumped 449,400 tons because of the new furnace built by the American Rolling Mill Co. at Ashland and also the company's enlargement of its Hamilton unit.

The enlarging of existing furnaces in Pittsburgh will enable that district to produce 309,200 additional tons of pig iron yearly. The restoration of one of the Joliet furnaces at Duluth by the American Steel & Wire Co., together with the rebuilding of existing smelters, has given Chicago an extra 110,860 tons to play with. Three other districts have grown in blast furnace capacity. They are: Cleveland, up to 56,000 tons; Wheeling, up 31,700 tons, and St. Louis, up 15,880 tons.

A listing of new and enlarged furnaces that went into blast in 1942 *appeared in Jan. 7,* 1943, *issue of* THE IRON AGE, *p.* 93.

Additional blast furnace capacity that will be available during 1943 follows:

Company	Plant Location	Rated Annual Capacity Net Tons	Expected Completion
Inland Steel Co.	Indiana Harbor	450,000	Late April
Inland Steel Co.	Indiana Harbor	450,000	Late May
Carnegie-Illinois.	Braddock, Pa.	430,000	Late Feb.
Carnegie-Illinois.	Braddock, Pa.	430,000	Late Mar.
Pittsburgh Steel.	Monessen, Pa.	432,000	March
Republic Steel	Cleveland	450,000	May
Republic Steel	Chicago	450,000	March
Columbia Steel.	Geneva	383,000	May
Columbia Steel.	Geneva	383,000	June
Lone Star Steel.	Daingerfield, Tex.	432,000	July
Sheffield Steel	Houston, Tex.	245,000	June

Weirton Employees Hail Ingot Production Record.

• • • **In February**, average production of steel ingots at Weirton Steel Co. was 5,147 net tons, a new record 67 tons over the previous peak established last December, according to announcement March 1 by the Weirton joint labor-management committee.

New production records also were established in nearly all of the various finishing mills which processed the steel ingots into finished forms.

SAVE VALUABLE WORK HOURS
Perkins Man Coolers keep men cool. Comfortable workers produce more. Give them a steady re-circulation of air.
Perkins Man Coolers are made in stationary and oscillating types, both portable.
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GIRLS

THEY CALL ME "FOX HOLE JOE"

War Story for Women Only

"Seems hard to believe that only last year I was working in Newark. I've seen so much hell on earth the past few weeks, sleeping in muck up to my ears, dodging bullets, parrying cold steel bayonets, picking myself up after shell explosions. Boy, oh boy, for the peace and quiet of a day back at my job in the factory. I'm not complaining mind you, I'm in here to kill all the devils I can, so Sis and Mom and all you girls will never have them get near you. Only one thing puzzles me a little. I've heard from home that war plants begging girls to come to work can't seem to get all they need even when they'll pay well while they train 'em. Can that be possible?"

How about it girls? Can it be possible you keep thinking that some day you might try war work but just don't get around to it? Well, here's your chance to get in now. If you're 18 to 45 years old, come to National Union at 48 Spring St., Newark, N. J. We'll teach you to make radio tubes our boys need so badly on every battle front . . . and we'll pay you well while learning. Please come see us any day from 8 A. M. to 5 P. M., Saturday, 9 A. M. to 3 P. M. Do not apply if now engaged in a war industry.

National Union Radio Corporation

This Saves Man-Hours!

Pre-assembled SHAKEPROOF Lock Washer and Screw... handles as a single unit...speeds assembly operations!

SEMS Fastener Units have proven their outstanding production advantages in hundreds of war equipment applications. Because they are pre-assembled, they eliminate the time formerly required for putting the lock washer on the screw. "Green" workers can handle them easily and there is no chance to "forget" the lock washer. SEMS units not only speed up assembly but also assure positive locking for every screw—an important factor in quality control. Write for free testing samples today!

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EASY TO HANDLE FASTER DRIVING!

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SEMS FASTENER UNITS

Unions Charged in Car Shop Slowup

Michigan City, Ind.

• • • **Charging the union** with fostering sitdowns which curtailed construction of vitally needed railway cars, the Pullman-Standard Car Mfg. Co. last week notified the Brotherhood of Railway Carmen of America (AFL) that it had abrogated its contract with the union representing workers at the local plant. The company cited 15 instances of sitdowns between Feb. 10 and March 2.

Mr. Logmann, works manager, asserted that the union had endeavored to curtail production of cars for the Union Pacific to 22 cars a day, then to 25 and finally to 24, while the company is equipped to turn out 27 cars per 9-hr. day. This schedule of 27 cars a day has been maintained for years, he said, without difficulty.

Meanwhile, work has been going on as usual at the plant, pending a decision by WLB on the dispute between the company and the union arising out of the 27-cars a day schedule. This dispute was certified to WLB after one of the sitdowns on Feb. 10.

The Union Pacific cars being turned out by the company are for use in connection with new steel making facilities being established along the railroad. This week, if the material situation permits, production will begin on cars for the Army for overseas use.

•

Great Lakes Shippers See WLB Order as Contradictory

Chicago

• • • **WLB categorical** rejection of the National Maritime Union's demand for a union hiring hall system on Great Lakes vessels of Inland Steel

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MECHANIC'S IDEA WINS AWARD: Jack Hennessy, employed by the Geo. D. Roper Corp., Rockford, Ill., has been awarded the *Chicago Tribune* War Workers Award for developing two machines which have aided the production of 75 mm. shot. One machine which Hennessy developed, shown in the accompanying photograph, is a single spindle drill for drilling tracer holes in the shot. This replaced a four-spindle drill press which had caused a bottleneck. Hennessy's machine has increased production by 300 per cent. It can be operated by an unskilled worker as compared with three skilled operators for the original machines. The award winner also developed a milling machine which mills slots in the nose of the shot.

from BRASS to STEEL CASES

for .22 to .45 caliber and 37 MM to 105 MM's — and cleaned with

Wyandotte

A change from brass drawn cartridge cases to steel cases presents new cleaning problems—problems that Wyandotte Engineers have already met.

Due to the successful work of Wyandotte Cleaning Specialists with pilot line operations, steel-drawn cartridge cases are being cleaned rapidly and economically.

Wyandotte has developed special degreasing compounds for cleaning the steel discs—for the cleaning operations between draws, either when a drawing compound alone is used or when the steel is Cuprodined, Bonderized, or copper-plated for drawing purposes—and for cleaning the finished case before final finish.

Wyandotte Metal Cleaning and Degreasing Products together with the experienced service given by Wyandotte Field Engineers are proving of value to manufacturers of cartridge cases, projectiles, bomb bodies, bomb fins, airplane motor parts . . . There is a Wyandotte Cleaner for every metal cleaning job and for use in all types of equipment.

Your Wyandotte Representative is ready to help you now.

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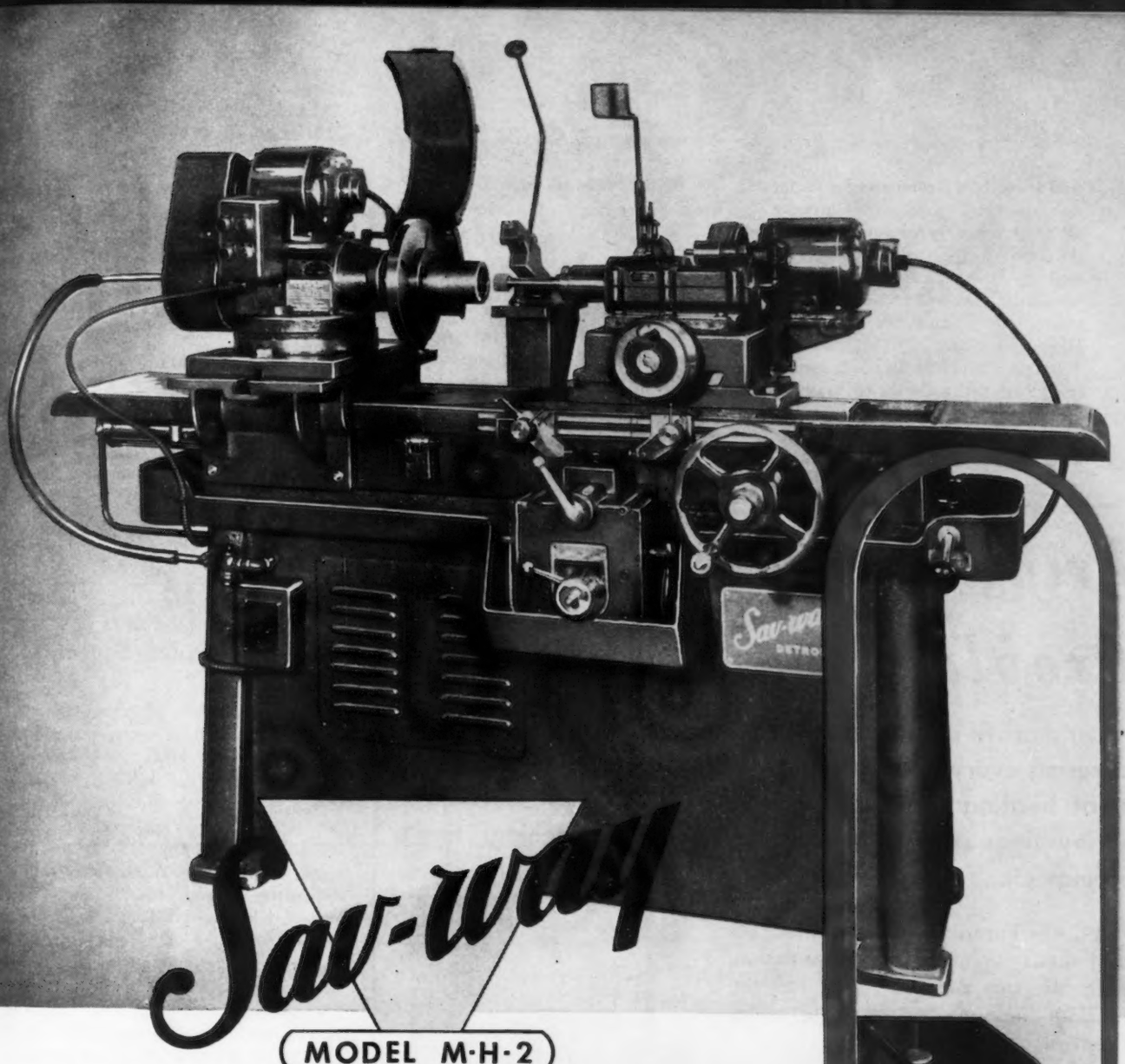
• *Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.*



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MODEL M-H-2

INTERNAL GRINDER

With Both

POWER and HAND FEED

One easy move of lever gives operator the choice of either hand or power feed, and neither one is dependent on the other . . . this permits top speed power grinding for diameter, and an instant switch-over to hand operation for close decimal depth grinding when desired . . . finishes the job with one set-up in place of two, and eliminates possibility of "run-outs" . . . one Sav-way model MH2 actually will do the work which formerly required two machines to do.

Send for "Bulletin MH2" which gives complete specifications.

Shift lever pushed in and feed engaged for operation of machine manually; power feed is now disengaged.

Shift lever pulled out and feed engaged for operation of machine by power; hand feed is now disengaged.

Sav-way INDUSTRIES

★ Machine Tool Division ★

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and three other companies was lauded as wise last week by Clarence B. Randall, vice president of Inland. Affected in the order besides Inland and the union are the Interstate Steamship Co., Bethlehem Transportation Corp. and the International Harvester Co.

In his statement Randall contended that "we are ordered to maintain a certain percentage of union men," which he held was discrimination and a violation of the Wagner Act because, in order to maintain that "certain percentage of union men" it is necessary to ask a man if he belonged to a union. In certain cases union men would be discriminated against; in others, non-union men.

He stressed what he termed a "contradiction" to this in another part of the text which "expressly says that we should not discriminate because of membership or non-membership in the union."

Payrolls in Steel Up During January

• • • Employment and payrolls in the steel industry both increased during January, according to the American Iron & Steel Institute. The January average of 637,000 employees compared with 633,000 in December. Total steel payrolls established a new peak of $129,760,000 in January, as against the previous record of $129,368,000 in December. In January, 1942, the steel industry had 651,000 employees and disbursed a total of $118,785,000 in payrolls.

Plant Discharges Men In Midst of Labor Squeeze

Cleveland

• • • In the midst of a critical labor shortage at a time when war plants are beating the bush for manpower, the Cleveland Tractor Co., Cleveland, this week was forced to lay off some 100 to 150 employees from the third shift in the company's around-the-clock operations. A combination of difficulties forced this action, it was stated, with material shortages being the main factor. The company, now engaged in production of a special type of full-track for use at air bases for towing, servicing and handling planes and supplies, felt the layoff was necessary to unify and coordinate the company's operations.

In the past, three shift operation schedules were maintained, but less than one-third of the third shift and one-half of the second shift personnel has been working full time recently.

Republic Steel's 61-Oven Coke Plant Now Operating

Cleveland

• • • Republic Steel Corp.'s new 61-oven by-products coke plant at Warren, Ohio, has been placed in operation.

Coke from the new battery will supply the fuel for the 1100-ton blast furnace which was lit at Republic's Youngstown plant Oct. 12, 1942. The battery, with a capacity of more than 1000 tons of coke daily, was built by Republic for the Defense Plant Corp. to supplement the 63-oven by-products plant at Warren and the huge by-products plant at the Youngstown works.

The new by-products plant and exhauster will not be completed for several months.

Bring Your Heat Treating Problems to VULCAN

. . . and profit by the results of many successful installations covering every heat treating and heating requirement . . . ingot heating; forging; heating for forming; annealing; normalizing; stress relieving; hardening; quenching; tempering; etc.

VULCAN Furnaces are designed for continuous or intermittent operation, using oil, gas or electricity for the heating medium, and may be either direct or convection fired.

VULCAN Electric Salt Bath Furnaces can be furnished for radiant heating outside the pot, immersion heating inside the pot, or *immersed electrodes* for potless types.

Modern design, construction and control assure quick heating, economical operation and absolute uniformity. Each furnace custom-built to meet individual heating or heat treating requirements.

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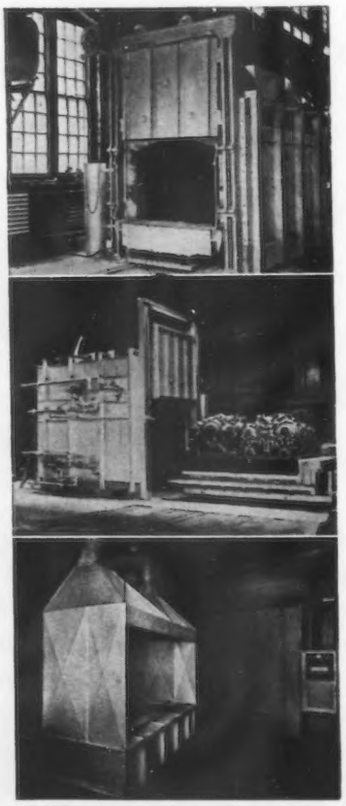

Illustrated—
Top: Convection Type Car Hearth Furnace.
Middle: Direct Fired Car Hearth Furnace.
Bottom: Pot Type Salt Bath Furnace.

Ask VULCAN engineers for their recommendations. Write, wire, or phone for representative.

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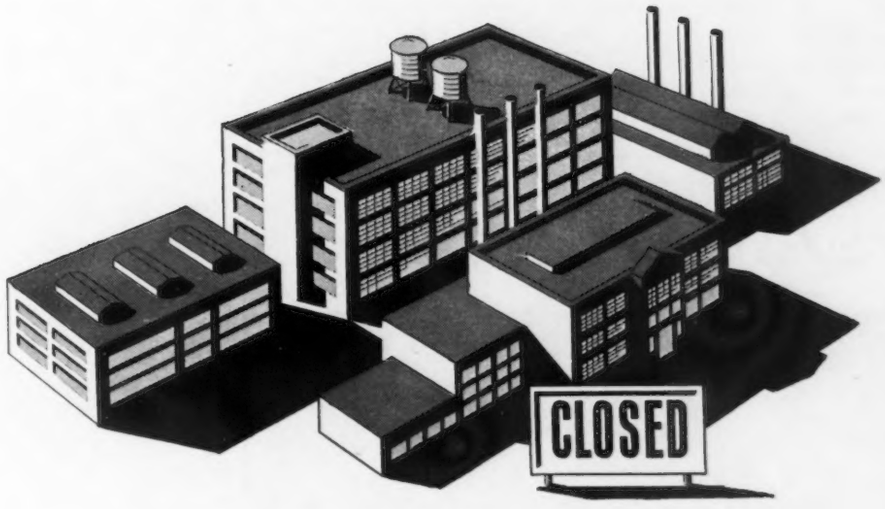
FOR WANT OF A "Part"...
A PLANT WAS CLOSED



EXCEPT for one difficult part, your new product or your present war production may be all set. Failure to procure that one part may block an otherwise successful program . . . might even close your plant!

If a problem of this type is bothering you...if it involves redesigning for use or production...if you are not fully equipped to make it...KAYDON can manufacture it for you, on a production basis, with unfailing precision and assured delivery.

Contact KAYDON

The KAYDON organization welcomes such problems . . . is qualified to cooperate with your organization in putting your plans into *action!*

If the need for difficult parts is retarding your war production or development of your post-war products, KAYDON offers precision facilities *plus* a broad background of manufacturing and technical experience.

THE KAYDON ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON, MICH.

Specialists in Difficult Manufacturing

Ice on Great Lakes Prevents Early Start

Cleveland

• • • **Hopes** for an early beginning date for lake traffic this year have been squelched firmly by Old Man Winter, who refuses to release his icy grip on the lake regions. Very thick ice has been reported in the upper lakes and even in the lower regions unusually heavy ice flows still make traffic movement treacherous.

One coal movement along lower Lake Erie has been made but no thought has even been given to sending any of the ore carriers uplake yet. Last year a very early beginning was possible, because ice moved out of the lakes early. The first boats started on March 24. However, many of the old timers in the ore traffic say that two early years in a row are very rare.

Hazarding a guess, it is estimated that the season will not open before April 12, and even at that time ice breakers may have to be used. The use of ice breakers in clearing a channel through to the upper lake ports, however, doesn't solve all difficulties.

With a greater number of ore boats in service this year, there probably still will be difficulty in moving the ore quota downlake. The Maritime Commission's 16 boats will be in by the middle of the season, it is hoped, and with the Canadian boats, ore movement will be fast and heavy.

Production of usable iron ore in the United States in January totaled 3,214,043 net tons, a decrease of 4 per cent from the 3,352,559 tons produced in December, according to the Bureau of Mines, United States Department of the Interior. Shipments decreased from 1,696,460 tons in December to 1,360,478 tons in January.

•

95,000,000 Tons of Ore Goal for Vessel Movement

Washington

• • • **A tentative quota** of 95,000,000 gross tons of ore for the 1943 Great Lakes iron ore movement was set by WPB on Monday. The quota, subject to revision, is almost 3,000,000 tons more than the record 92,076,781 tons moved in the 1942 season and is 15,000,000 tons higher than the 1941 figure.

Auto Council Creates New Manpower Division

Detroit

• • • **Creation of a** Manpower Utilization Division as a new branch of the Automotive Council for War Production was announced this week to obtain the fullest efficient utilization of manpower in production plants. C. E. Wilson, president of General Motors Corp., was named chairman of the new division. Other members of his committee include:

W. F. Armstrong, vice-president, Nash-Kelvinator Corp.; C. C. Carlton, vice-president, Motor Wheel Corp.; George T. Christopher, president, Packard Motor Car Co.; W. J. Corbett, vice-president, Sparks-Withington Co.; Robert H. Daisley, vice-president, Eaton Manufacturing Co.; Foster L. Fralick, vice-president and general manager, Koestlin Tool & Die Corp.; Ben F. Hopkins, president, Cleveland Graphite Bronze Co.; Royse G. Martin, president, Electric Auto-Lite Co.; G. W. Kennedy, president, Kelsey-Hayes Wheel Co.; M. J. LaCroix, asst. to vice-president, International Harvester Co.; E. A. Clark, vice-president, Budd Wheel Co.; C. J. Reese, president, Continental Motors Corp.; W. Dean Robinson, vice-president, Briggs Mfg. Co.; I. B. Swegles, vice-president, Hudson Motor Car Co.; H. L. Weckler, vice-president and general manager, Chrysler Corp.; Ray Rausch, in charge of Rouge operations, Ford Motor Co., and Harold Vance, chairman, Studebaker Corp.

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Chrysler Sub-Contractors Total 8,079

Detroit

• • • **Chrysler Corp.**, with more than $2,000,000,000 in war contracts now being produced, has sub-contracted 58.2 per cent of the total to smaller companies, it was stated in a report released by Herman L. Weckler, vice-president and general manager, detailing the sub-contracting program.

Sub-contracting involves 8,079 individual companies located in 856 cities and 39 states. Of these 4,690 are relatively small, 1,607 are medium size and 782 classify as large.

Of 4,500 different parts in tanks, more than 3,000 are made by sub-contractors. Of 950 gun parts, 522 are made outside. Of the 11,542 parts in the Martin B-26 bomber sections made by Chrysler, 5,881 of them are supplied by outside concerns. As regards Dodge trucks, 3,783 of the 5,101 individual parts are sub-contracted; on gyro-compasses, 303 out of 406 different parts are produced outside.

Chrysler Corp. had about 1,600 suppliers during its peacetime operations, so its relationship with sub-contractors has multiplied five times during the war period. This has necessitated the development of a large corps of expediters and liaison agents to work with sub-contractors. It has also given these additional 6500 outside companies a contact with Chrysler Corp. for the first time probably in most of their histories. From a sales standpoint this is a "foot in the door," and it is considered indicative of harder competition in the peacetime period for the automotive supplier community.

Another observation which derives from the Chrysler report is the fact that the production balance between sub-contractor and primary contractor is much more delicate today than ever before. Some 60 per cent of the parts going into Chrysler war products, as reported above, are made outside the corporation. Delivery failures on the part of any of the 8000 contractors, whether due to their own slip-ups or to transportation difficulties or to other problems, have a profound effect on primary production schedules.

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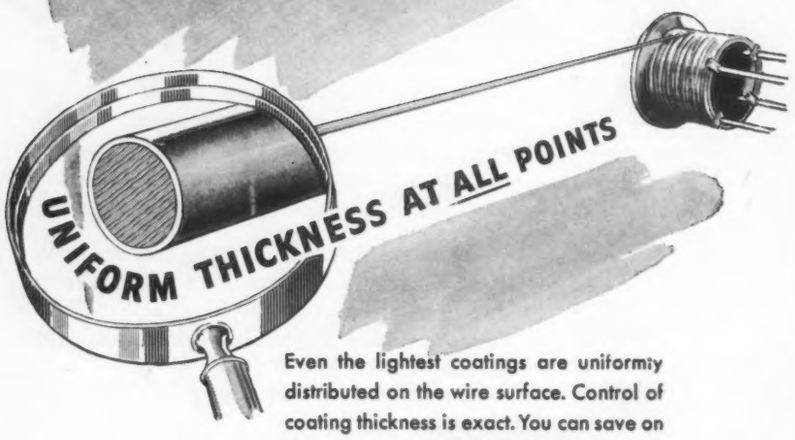

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East Reports Temporary Over-Production of Pig Iron

Philadelphia

• • • **Recent over production of** pig iron throughout the East is reported. The condition is considered to be only temporary since furnaces have been pushed to capacity and this spring about 20 probably will have to be relined, taking each out of production for at least a month. On the other hand, 15 new furnaces are going into production this spring and summer.

More than 80 furnaces may be relined during the entire year, it is reported, twice as many as went out for relining last year.

The over production is attributed to the easier scrap situation for steel mills, and to the fact that pipe makers' contracts for cantonments have been filled and they are out of the pig iron market.

March pig iron allocations were higher than for previous months, with a larger percentage, also, of requested material allocated.

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... Confusion in Alloy Steel Schedules

Washington

• • • A lack of coordinated planning in alloy steel distribution, shortsighted ordering practices on the part of aircraft companies, plus paper confusion, have created temporary shortages in steel for aircraft. The WPB Steel Division report on this matter issued recently revealed that a coordinated effort between the Aircraft Scheduling Unit, the Aircraft Material Command, and the Aircraft Resources Control Office on the one hand and the Steel Division on the other was initiated early in January. (This effort to improve aircraft output was mentioned in "This Industrial Week" section of THE IRON AGE, Feb. 18, page 94).

Some remedies recommended by the report have already been put into effect. ASU and the WPB Steel Division are going to attempt to smooth distribution by a close check on inventory, the pooling of small orders and the adequate stocking of designated warehouses, the regulation of aircraft companies ordering practices, and improvement in requirements and handling of reporting forms.

Notwithstanding difficulties, the report says that it has been determined that aircraft takes about 20 per cent of alloy steel supply, and that the industry received the steel. However, there were some delivery trouble spots with respect to particular analyses, sizes and shapes. Moreover, the amazing increased speed of United States plane production was disclosed by the fact that the average time it takes from raw material to actual fly-away has been reduced from nine months in the last quarter of 1942 to seven months in the first three months of this year.

Arrangements are being made by the WPB Steel Division and the Aircraft Scheduling Unit actually to inspect the inventories of the 50 largest plane manufacturers who represent 80 per cent of the industry with regard to consumption of aircraft alloys. Monthly consumption will be checked. It is believed that this survey will be effective in locating surplus stocks and correcting future unbalanced ordering. Excessive inventories, the report says, can be corrected by cutting down future allotments, adjusting melt schedules and by redistribution of surplus stocks. Preliminary investigations have shown that processed alloy steel in the hands of plane companies far exceeds the consumption rate. Previous reporting methods have not shown up this condition.

Order pooling at the mill level to take the confusion out of melting and rolling schedules has been ordered studied by joint agencies. Small orders coming in at varying periods have to be held up until it is technically feasible or economically practical to melt them.

While large orders do not present the same problem the report said that:

"It is believed that a detailed scrutiny of all critical items by size, grade, analysis, etc., will make it possible to shift orders and combine rollings which will relieve some of these items very promptly."

Steel producers have been asked to study the advantages of pooling and to make recommendation of procedure in future months in connection with possible combining of orders and consequent improvement in deliveries.

Strategically located, 26 warehouses have been set up to carry stocks of standard sizes and grades of aircraft alloy steels. Aircraft companies have been told what amounts may be secured at the warehouses, with limits as to minimum and maximum orders provided. Amounts in excess of the maximum may not be withdrawn without ASU approval.

Small orders for items not carried in stock will be handled by instructing mills to roll the prescribed minimum quantities, shipping the full amount to a central warehouse which will fill the order and hold the balance subject to future orders. This action will be taken on each individual order only after joint determination by the Steel Division and ASU that the item cannot be filled in any other manner. A reserve fund of $100,000 has been provided to indemnify the holder for any items which may remain unshipped.

The report makes it clear that plane companies need steel buying education. The ASU at Dayton and the WPB Steel Division will tell companies when and where to buy so that orders will be placed with mills that are best able to produce particular grades, sizes and analyses of steel. Airforce Material Command will place letters of intent and contracts sufficiently in advance to permit consumers to place orders for alloy steel in accordance with CMP Regulation's time schedule requiring the placement of orders well in ad-

How's U. S. War Production Proceeding?

Highlights of Latest Official Reports

STEEL INGOT OUTPUT	6,811,882 net tons in February	Average weekly output LIXXX 1,702,970 tons vs. 1,672,403 year ago.
CARGO SHIP DELIVERIES	1,239,200 tons in February (130 vessels)	In two months of 1943, numerical total exceeds six months of 1942. Admiral E. S. Land eyes goal of 20,000,000 tons for 1943.
COMBAT VESSEL DELIVERIES	20,000 tons in February (150 warships)	Twenty were cargo craft converted to combat use. "Several score" of speedy new destroyer-escort craft now in water.
LANDING BARGES	700 produced in February	Total includes 100 large-type barges.
STEEL PLATE SHIPMENTS	1,072,001 tons in February	Daily shipments averaged 38,285 net tons vs. 36,626 in January.
AIRCRAFT PRODUCTION	5,500 made in February	Includes 3,250 combat planes.
NAVY'S ANNUAL REPORT	$31.9 billion spent or committed during year ending 6-30-42. Includes $2 billion for naval ordnance.	During the year private yards building Navy ships increased from 108 to 293. Construction of 5,675,000 tons of naval craft authorized in two years—all in service in 1945.

Found Factor in Aircraft Difficulties . . .

vance of desired delivery dates. It has been found that late orders and improper scheduling of orders with respect to delivery dates desired is a common practice holding up production.

Also aircraft companies have failed to notify steel producers which shipment should be delayed or canceled. The failure to notify steel producers of cancellation or need for delayed delivery is one of the causes of building up excessive inventories.

Aircraft companies have been instructed to examine thoroughly outstanding orders with a view to canceling them in whole or in part, or revise requested delivery dates to conform with actual current needs. Steel producers have been asked to contact all customers asking for revision of requested delivery dates for all unshipped orders. The report asserts when the schedules have been approved as revised by ASU and the Steel Division and they will reflect orders which are actually delinquent as to current months and previous months as to requested delivery. Previous reporting methods have not disclosed this condition.

At the base of much of the maldistribution is paper handling. Originally, the priorities system forced mills to accept more orders than could be handled. Other mills had room on melting schedules. Production direction is expected to remedy this fault, but because of priorities mill schedules have not reflected end product delivery requirements. They could not because all that was required was a showing of the preference rating, dates of orders and the contractors' statement of need which do not necessarily show contractors' delivery requirements.

Alloy steel producers have been required by WPB to submit their melting schedules for approval on Form PD-391. Heretofore, if WPB or the ASU wanted to review aircraft alloy proposed heats, they have had to wade through all of the forms PD-391 submitted by industry. There were about 4500 of these, with each page of the schedule containing about 20 items. This condition will be remedied by steel producers segregating aircraft alloy steel melts so that the agencies can dispense with a huge amount of irritating clerical work.

The fact that under PRP all alloy steel producers were requested to code (the system of using a number to represent a given steel product or fabricated article) all orders as aircraft if the preponderance of their business was aircraft, caused a great deal of inaccurate information to be developed. More accurate information is needed to develop requirements, and control production rate through scheduling. Consequently, Order M-21-a will be amended to provide a special end use code for the aircraft industry to be used by steel producers and plane companies in coding orders.

Breakdowns of the code include the following headings: Engines, propellers, airframes and Aircraft B items (largely assemblies and subassemblies, parts, etc.). Numbers assigned to products and fabricated articles range from "10" to "250." WPB says that the information developed through plane manufacturers coding all orders to steel mills will enable ASU to relate current delivery requests to authorized aircraft production programs.

ASU is going to review all PD-391's with a view to determining the urgency of each item and to make recommendation to the Steel Division. This is considered helpful because ASU has current records of the programs of each aircraft prime contractor, and can tell which program is in need of specific products to keep plane delivery schedules in adjustment.

ASU has developed a form ASU-16 to take care of emergency steel needs. This form which may be made mandatory requests data from plane manufacturers to show the urgency for various items. Prime and secondary contractors are now being urged to use ASU-16, and set up production control systems so that ASU-16 will become the method of expediting.

WPB says that a great many critical shortages are forced on ASU by "higher authority" without filing ASU-16 forms and the recommendation is made that this practice be discontinued. The report recommends that contractors' representatives should be directed to the Aircraft Scheduling Unit at Dayton for all matters pertaining to the relief of critical shortages already filed on ASU-16 and instructions issued to all other agencies not to interview such representatives.

Approximately 95 per cent of all aircraft melting schedules are going to be firmly fixed by the first of each month with 5 per cent of all melts left open for ASU emergency orders up to the 10th of each month. The previous reserve for emergencies was 2 per cent.

Recommendation is made that the Aircraft Resources Control office to have certain reserve tonnage set up to take care of model changes, schedule changes, emergency modifications, in order to materially decrease the number of critical shortages.

Among the Latest Reports of 1942 Earnings

Company	1942 Net Income	1941 Net Income	Remarks
Bethlehem Steel Corp.	$25,387,760	$34,457,796	Common share earnings were $6.31 compared with $9.35 in 1941. Net billings were $1,511,672,299 for 1942 compared with $961,240,737.
Republic Steel Corp.	17,154,000	24,038,340	Net sales rose 8% in 1942 to new high of $521,110,000.
Wheeling Steel Corp.	4,441,964	8,506,304	Sales declined from $131,205,180 to $118,988,790.
Allegheny-Ludlum Steel Co.	4,861,484	5,062,709	Common shares earned $3.71.
Vanadium Alloys Steel Co.	488,662*	.....	*For first 6 months of fiscal year.
Scullin Steel Co.	316,010	588,416	After $100,000 sinking fund provision and $25,000 note.
General Electric Co.	45,082,000	57,197,000	Common share earnings down 21% from $1.98 to $1.56 in 1942. Taxes increased 54% from $144,978,000 to $223,697,000.
Sharon Steel Corp.	1,383,064	1,633,363	
Wickwire-Spencer Steel Co.	2,099,004	1,578,463	Equals $4.57 per share before deducting $500,000 con't. reserve.

Alloy Steel for Aircraft Emphasized by WPB

Washington

• • • **At the monthly** meeting last Thursday of the Iron and Steel Industry Advisory Committee with officials of the WPB Steel Division, discussion emphasized the importance of supplying the quantity, type and grade of alloy steel products needed by the aircraft industry. Steel Division Director H. G. Batcheller, government presiding officer, reported that progress is being made in directing an increasing flow of alloy steel products to aircraft makers. The industry offered its full cooperation to aid the newly established Aircraft Alloy Steel Section in carrying out its work.

It was disclosed that difficulties regarding the utilization of alloy steel turnings are being solved rapidly. Despite some obstacles, the Steel Division reported that 32,355 tons of alloy turnings were allocated during February, an increase of nearly 30 per cent over January allocations. Eventually, the Division hopes to allocate approximately 100,000 tons of these turnings each month.

The committee recommended to the Steel Division that the following policies concerning scrap be put into effect:

1. That the Steel Division allocate to producers of ingots, and that producers be required to use, alloy steel turnings in an amount reaching at least 8 per cent of their monthly ingot production. (See THE IRON AGE, March 4, pages 135 and 142.)
2. That all consumers of carbon steel turnings be required to check closely on the analysis of the turnings to prevent inadvertent waste of alloys.
3. That steel companies continue to purchase their full requirements for scrap at OPA ceiling prices.

Argentine Export Procedure Is Revised

Washington

• • • **Effective April 1,** exportations to Argentina may no longer be made under general license, with certain exceptions, BEW has announced. After that date applications for individual licenses will not be considered for shipments to Argentina except under the procedure outlined in current Export Bulletin No. 77.

December Stockpiles Up 3% Over November

• • • Domestic stocks of iron and steel scrap at the end of December, 1942, approximated 6,930,000 gross tons, representing an increase of 3 per cent over the 6,742,000 tons reported on Nov. 30, 1942, according to the Bureau of Mines. Consumers' stocks increased 3 per cent, with suppliers' and producers' stocks increasing 1 per cent. Thus, while consumers' stocks on Dec. 31 amounted to 5,602,000 tons, compared with 5,427,000 tons at the end of November, suppliers' and producers' stocks were 1,328,000 tons and 1,315,000 tons, respectively. The majority of the increase in total stocks was contributed by an increase of 3 per cent in stocks of purchased scrap at consumers' plants, while consumers' stocks of home scrap gained approximately 4 per cent.

80,000 tons of billets sheared in 864 hours!

This Coast Metals hard-faced hot shear knife CAN TAKE IT!

INSTALLED in the tough bottom position, where it was continually subjected to shock and sprayed with water, it made 15 cuts every 2 minutes of 4½" x 9" x 36" stock,—for a total of 80,000 tons of billets! Thanks to its wear-resistant Coast Metals Hard-Facing, it stayed steadily on the job for 864 hours! Yet, in the same time, each of 4 upper blades was worn out in about 200 hours!

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Easily applied by arc or acetylene welding to surfaces, edges, points of *new* or *old* equipment parts of *any* ferrous metal. Write for new folder.

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Through-put speeds of 50 to 1000 F.P.M. simply by varying roll angularity and by varying the gear arrangement which is *built into the machine.*

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No space taking projections or extensions. Medart's Universal 2 & 2 is more compact and takes less floor space.

4

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Simplified operation requires no special operating or maintenance skill, no universal joints, no bevel gears, no separate gear reduction unit.

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Machine can be used on scaled, rusty or dirty work pieces. This also permits free use of circulating or polishing fluid if needed.

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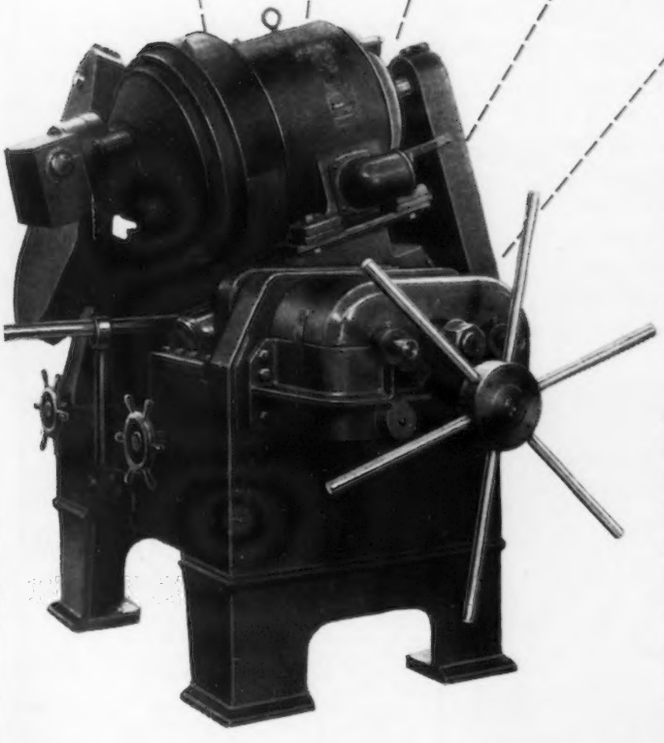

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Only Medart presents a complete, proven line of all-purpose bar and tube machines

Manufacturing Engineers of Complete Transmission Equipment and Specialized Machinery

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Army Tank Plants below Capacity

Detroit

• • • **Tank production** plants in the mid-west are operating well below capacity levels and several are considerably reduced from the manufacturing operations which prevailed in December and January.

That this trend is general was indicated by the report from a Pennsylvania city, that one company has terminated its third shift and made reductions in the two other shifts as a result of curtailment orders. A plant in Missouri will discontinue the assembly of tanks.

Some observers expect the closing of additional plants, and the grouping of production in factories in less strategic employment areas, developing reservoirs of manpower in sections where there are notable shortages of help. However, nothing official is yet heard in this direction.

The Army has permitted release of the fact that Ford Motor Co. is in production on amphibian jeeps, adaptations of land vehicles which also function on water.

The chassis and motor are almost identically those of the land vehicles. Instead of the orthodox jeep body, however, the shell of the vehicle is a boat-like welded structure. A propeller in the rear furnishes motivation when the vehicle is driven off the land into water. Speeds on water, of course, are considerably lower than possible on land. Production is on a regular basis.

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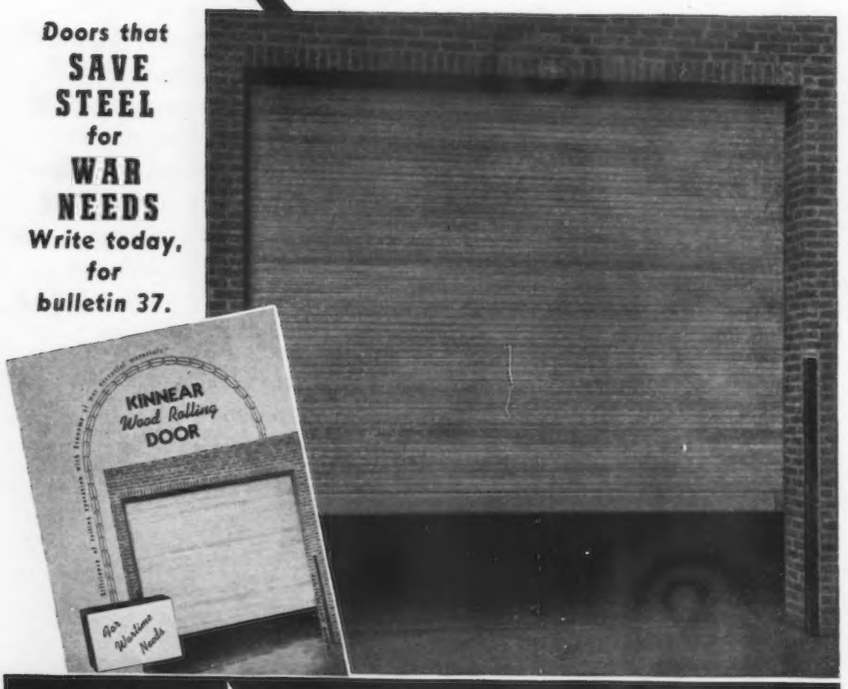

SAVING WAYS IN DOORWAYS

KINNEAR ROLLING DOORS

Cited for Award

• • • **The following companies** have recently been awarded the Army-Navy "E" for outstanding performance on war work, or have received renewals of the "E":

Consolidated Chemical Industries, Inc., Baton Rouge.
Davis Emergency Equipment Co., Inc., Newark.
Desmond-Stephan Mfg. Co., Urbana, Ohio.
Edison General Electric Appliance Co., Inc., Chicago.
Fairfield Mfg. Co., Lafayette, Ind.
General Electric Co., Appliance & Merchandise Department, Bridgeport Works, Bridgeport, Conn.
Kilby Steel Co., Anniston, Ala.
Fred M. Link, New York.
Oliver Farm Equipment Co., Springfield Plant, Springfield, Ohio.
Patterson Screen Co., Towanda, Pa.
Sebastian Lathe Co., Covington, Ky.
Solar Mfg. Corp., Avenue A Plant, Bayonne, N. J., and 52nd Street Plant, West New York, N. J.
Spun Steel Corp., Canton, Ohio.
Sprague Specialties Co., Plants 1 and 2, North Adams, Mass.
Truscon Steel Co., Youngstown, Ohio.
Uchtorff Co., Davenport, Iowa.
Van Dorn Iron Works Co., Cleveland.
T. C. Wheaton Co., Millville, N. J.
Wincharger Corp., East 7th and Division Streets Plant and Douglas Street Plant, Sioux City, Iowa.
Mathieson Alkali Works, Inc., Niagara Falls Plant, Niagara Falls, N. Y.
Westinghouse Electric & Mfg. Co., East Springfield, Mass.
Consolidated Steel Corp., Ltd., Los Angeles (star).
Ohio Injector Co., Wadsworth, Ohio (star).
S. F. Bowser & Co., Inc., Fort Wayne, Ind. (star).
Caterpillar Tractor Co., Peoria, Ill.
A. B. Farquhar Co., Ltd., York, Pa.
Crane Co., Chicago Works, Chicago.
Fidelity Machine Co., Philadelphia.
Babcock & Wilcox Tube Co., New York.
Ilg Electric Ventilating Co., Chicago.
Engineering & Research Corp., Riverdale, Md.
Durham Mfg. Co., Muncie, Ind.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J. (star).

MARITIME COMMISSION "M"

Mercer Tube & Mfg. Co., Sharon, Pa.
Edward Valve & Mfg. Co., Inc., East Chicago.

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THREE DAYS after the Japs bombed Pearl Harbor the Army tested and passed the first welded armor plate for all-welded tanks. Those first plates were welded with Alloy Rods Stainless Electrodes.

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Alloy Rods Company immediately designed Armorarc stainless electrodes for greater efficiency and adaptability for armor plate welding.

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Alloy Rods Company immediately expanded their plant to triple production of Armorarc electrodes.

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Today—FIRST IN WAR. Alloy Rods Company is the largest exclusive producer of stainless electrodes in the world.

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Tomorrow—FIRST IN PEACE. When the Axis is beaten, when the boys are home again and the war is won, Alloy Rods Company will return their plant to the production of Arcaloy stainless electrodes for welding the greater ships and planes and automobiles in the better world of tomorrow.

ALLOY RODS COMPANY

Stainless Steel Electrodes

YORK PENNSYLVANIA

Munitions Expansion Ends in Canada

Ottawa

• • • **Canada's** munitions plant expansion program has reached its zenith and from the present time forward the output of finished war supplies and equipment will show a rapid expansion, Finance Minister Ilsley stated.

No additional large plant expansions are under consideration, although work still is proceeding on extensions to the various steel plants, power projects and additions to war plants. Toward the middle of 1942, announcement was made from Ottawa to the effect that no further plants or plant additions would be permitted that could not be completed fully by the middle of 1943. As a result of this order there was a sharp cut in building activities in the latter part of last year, and so far this year no large war plant projects have been announced.

C. D. Howe announced that Canada has been delivering weekly eight or 10 cargo vessels of the 10,000-ton class for the past six months. Since Dec. 21, 1941, Mr. Howe stated, Canadian yards have delivered 97 cargo ships of 10,000 tons, while at this time 58 of these ships are in various stages of construction and 12 ships of 4,700 tons deadweight are being built in Canadian yards.

Canada has placed further restrictions on unessential use of certain type of metal and also set price ceilings on used metal pipe and shafting. Persons with more than 50 ft. of used pipe or any steel shafting, not required for use within 30 days must report particulars to the administrator within 30 days. No person may sell used metal pipe or shafting without a permit, except to a stipulated list of buyers.

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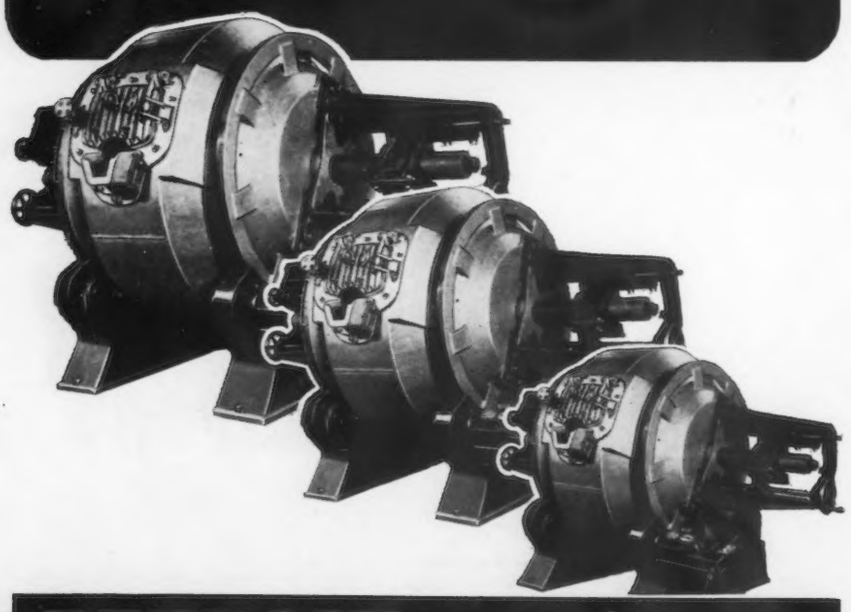
The Detroit Furnace is recognized in many jobbing and production foundries as an indispensable, metallurgical, production tool. It melts ferrous or non-ferrous metals and alloys with amazing speed under very precise control. Because of its speed and versatility, the Detroit Rocking Electric Furnace gives a higher rate of production of a better average quality of product at lower net cost.

From 10 to 8,000 lbs. per heat, there's a "Detroit" to fit your needs. Write today for complete facts about these efficient furnaces.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

Canada Announces New Priority Restrictions

Toronto

• • • **Canada has placed** further restrictions on manufacture of boilers and stokers. A new order prohibits manufacture of certain small sizes of low pressure welded steel boilers used for steam and hot water heating.

Another order prohibits manufacture of stokers for residences and small buildings. It also prohibits installation in any building of a stoker with capacity larger than is required by the actual heating requirements of the building. A generally standardized stoker model is to be manufactured by some 20 manufacturers and parts will be interchangeable. There will be nine sizes from 50 to 1200 lb. per hour.

Restrictions on manufacture in Canada of electrical apparatus are dealt with in an order by W. E. Ross, Administrator of Electrical Apparatus. The order provides that no person shall manufacture any generators, switchgear, circuit breakers, disconnecting switches, instrument transformers or instrument except to the order of the Department of Munitions and Supply or to the order of any other person who has obtained authorization in writing from the Administrator. Similar restrictions are placed on manufacture of generators, motors or control equipment.

SPEEDIER WINGS

without sacrifice of strength, fire power or protection. That's what the increased use of cast magnesium parts is giving America's planes. This lightest of structural metals, as cast at the Howard foundries, has ample strength for many weight-saving applications in the planes which are inexorably giving the United States full control of the air. Every pound saved means a little more speed — greater aircraft losses for the enemy, and far fewer for us.

Every week sees an increase in the tonnage of magnesium airplane castings shipped from our new foundry; and tons of aluminum, brass and bronze parts, too — always more bomb racks, bomb parts, gun mounts, turret mounts, landing wheels, nose pieces — to name only a few. Our three foundries are all turning out an endless volume of cast nonferrous parts for ordnance, tanks, tank destroyers, ships, machine tools and essential war machinery.

Howard should be a source of supply of non-ferrous castings for you.

For armament today—
for utility tomorrow.

Howard Foundry Company
4900 Bloomingdale Road Chicago

Electronics Is Subject Of Machine Tool Meeting

• • • **The application** of electronics to metal working tools will be explained by electronic engineers as one of the features of the 1943 Westinghouse Machine Tool Forum, to be held at the company's East Pittsburgh, Pa., works, April 6 and 7. Many of the problems facing machine tools manufacturers and users, today and in the future, will be discussed by recognized experts during the two-day sessions.

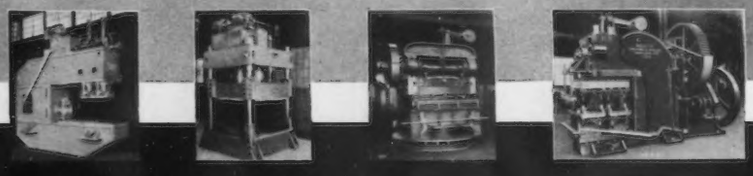
This will be the eighth annual forum sponsored by the firm. In addition to the forum on electronics application there will be at least six other major papers on current problems presented. Also scheduled for appearance are government representatives, leaders in the machine tool industry and Tell Berna, general manager of the National Machine Tool Builders Association.

BOTTLESHIPS or BATTLESHIPS?

America is racing against *time!* The program is a gigantic one! What we build now are not *museum-pieces* nor *mantel ornaments* . . . but real-size *armaments.* Ships, tanks, guns, planes — all must be built by the fastest, most efficient methods known. Our job, as designers and builders of heavy metal-working equipment, is to help you attain the ***production record*** which the President has set. If you have a production problem involving our line of equipment, let a *Beatty engineer* help you make *two* ship plates grow where *one* grew before . . . or other equally vital heavy metal fabrication problems. No obligation on your part.

BEATTY MACHINE AND MFG. COMPANY HAMMOND, IND.

BUILDERS OF HEAVY METAL WORKING TOOLS



Illustrating a few of Beatty's complete line of Hydraulic Forming Presses, Shears, Forcing Presses, Single- and Double-end Punches, Extruding Presses, Coping Machines, and others, built to help speed production.

Loopholes Found For Contract Refusals

Cleveland

• • • **In dividing the labor** markets of the United States into four categories, by the War Manpower Commission, there have arisen certain difficulties and misunderstandings among contractors and prime producers in the renewal of contracts and the acceptance of other work.

Under the WMC order, in the No. 1 critical labor areas no contracts may be renewed or no new contracts placed if alternate facilities are available in less critical areas. The ruling does not apply to sub-contracts and a prime contractor who finished a prime contract or loses it through the WMC order is not barred from replacing it with a sub-contract.

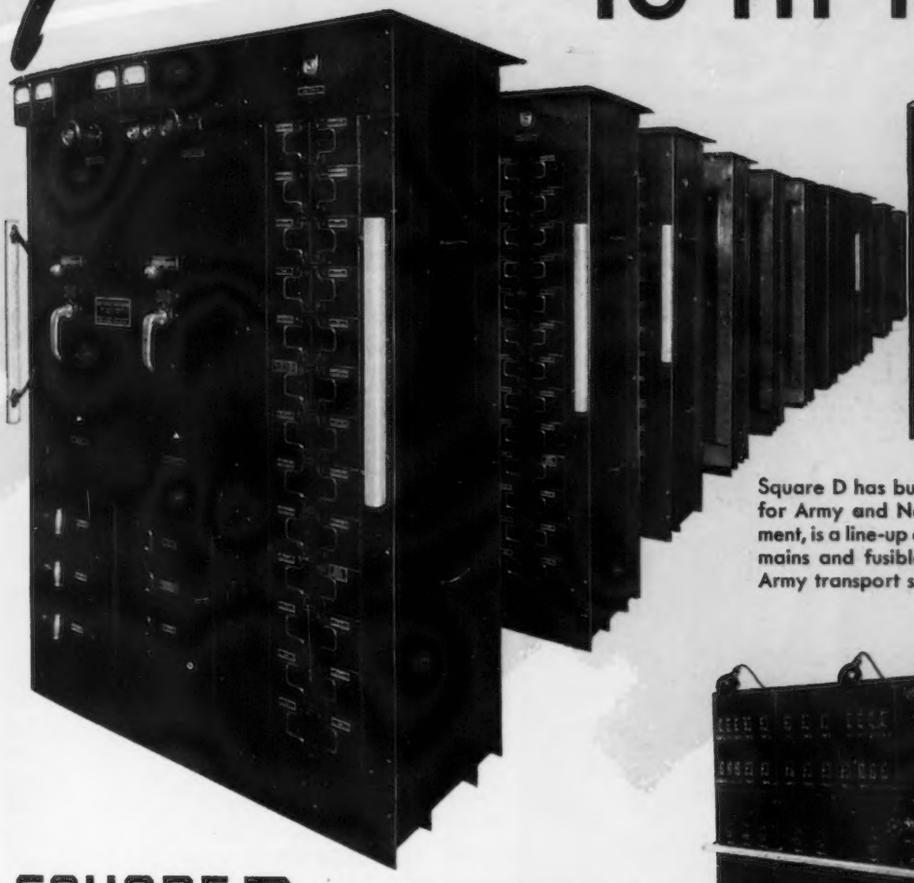
There are exceptions to the order under which contracts can be placed in the No. 1 critical labor areas. These exceptions include: (1) Firms employing less than 100 workers during the performance of the contract; (2) Contracts of $50,000 or less; (3) Plants certified by the Smaller War Plants Division, providing the firms require no substantial additional facilities and no labor in addition to that regularly employed. A producer in any of these classes can renew a contract or obtain a new one even though in a No. 1 critical labor area.

Another recourse in the effort for renewal of contracts where renewal is turned down by the Procurement Agencies because of being in the No. 1 WMC group is an appeal to the Critical Labor Area Appeals Board. Before the contract has been completed a manufacturer can determine whether it will be renewed by approaching the Procurement Office, and if the contract is not to be renewed on the grounds indicated under the WMC Labor Order, procedures can be started immediately to file an appeal.

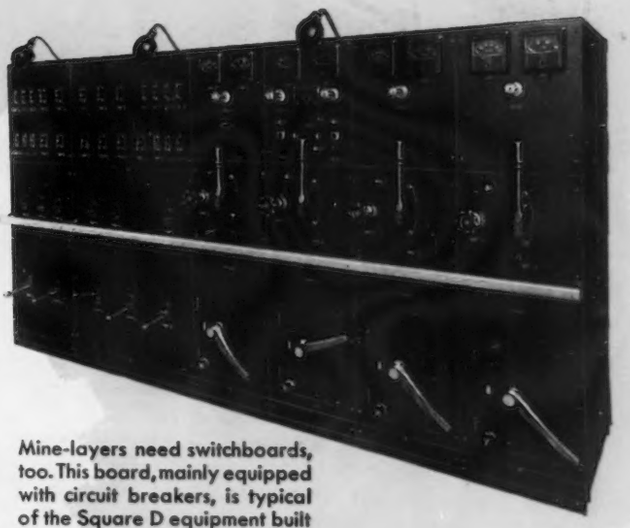
War Department Doubles Ford Motor Co. Contracts

• • • **Ford Motor Co.** contracts to build Pratt & Whitney aircraft engines were doubled recently by the War Department. A considerable amount of the new work will be subcontracted, in order to alleviate anticipated forthcoming manpower problems in Detroit, and a good share of the job will be done at Ford's Highland Park plant.

Tailored TO FIT THE JOB



Square D has built hundreds of marine switchboards for Army and Navy vessels. At left, ready for shipment, is a line-up of special boards with circuit breaker mains and fusible branches for installation on small Army transport ships.



Mine-layers need switchboards, too. This board, mainly equipped with circuit breakers, is typical of the Square D equipment built for them.

SQUARE D SWITCHBOARDS

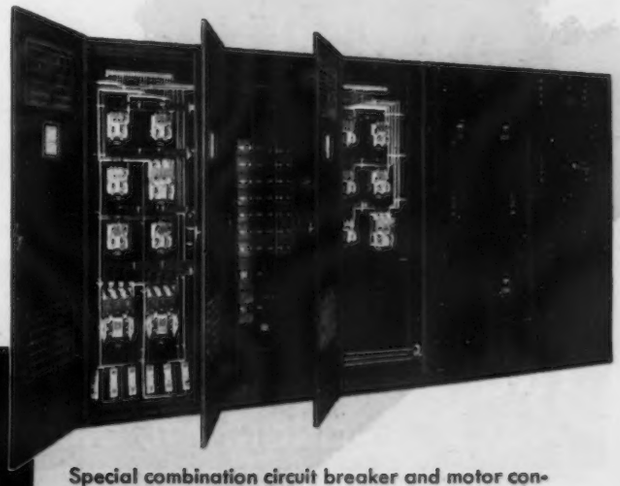
There is more than good workmanship involved in building switchboards for new or unusual applications. It takes a sound analysis of requirements by an engineer who knows his stuff, technically. (That's the Square D Field Engineer.) And it takes seasoned design engineers who chart the course for the men who build. (Years of experience have taught Square D designers the angles which really count.)

When you have a switchboard problem, let a Square D Field Engineer work with you. Maybe he can help you do the job better.

CALL IN A SQUARE D FIELD ENGINEER

You're welcome to the counsel of a Square D Field Engineer in tackling any problem which involves electrical control or distribution. He is in constant contact with plants of every kind and size. He studies methods and applications with the idea of simplifying new jobs or doing old ones better.

There are Field Engineers in Square D branch offices in 52 principal United States and Canadian cities. Their services are dedicated to solving industry's war and postwar electrical problems.



Special combination circuit breaker and motor control switchboard, with ten panels. Panels are arranged back-to-back to conserve space.

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

Idle Steel Recovery 70,000 Tons a Month

Washington

• • • **"Frozen steel"** produced for automobiles, household equipment and other items before their manufacture was restricted or stopped is being located and put to war uses at the rate of more than 70,000 tons monthly, according to A. Oram Fulton, assistant to the director of the WPB's Steel Division, in an address to members of the Purchasing Agents Assn. of Chicago on March 5.

"The shift from peace operations to war work has resulted in a large accumulation of excess steel," said Mr. Fulton. "It includes many varieties badly needed in war production, including stainless and alloy steels, carbon steel in structural shapes, bars, plates, sheet and strip, tubing, wire, castings and forgings, high alloy castings, tool steel, tinplate and other types. This tremendous stockpile of unused steel is estimated by some to run into millions of tons."

Last Spring the WPB took steps to get the idle steel into war production when Steel Recovery Corp., was formed.

It is expected the volume of steel being moved will reach its peak in May, continue on that level for several months, then gradually decline as supplies are exhausted. It is estimated that steel will be forthcoming from over 100,000 inventories, covering 17 varieties and aggregating perhaps 2 million items.

•

11,000 Tons Available For War Program in Month

• • • **Manufacturing** companies of the New York-New Jersey Region, by combing their inventories in response to an appeal of the WPB Regional Redistribution Division, have made available for the war program during the past month approximately 11,000 tons of steel, including more than 600 tons held by the companies for maintenance and repair purposes.

Structural Steel Shows Decline to 57,865 Tons

• • • **Reflecting the** stringent efforts of WPB to conserve the use of steel for immediate and direct war purposes, the bookings of fabricated structural steel for January declined to 57,865 tons, according to reports received by the American Institute of Steel Construction. This figure compares with 183,387 tons in the corresponding month of 1942. Shipments fell to 105,869 tons compared with 167,753 tons in 1942. The backlog tonnage available for future fabrication at Jan. 31 was 489,320 tons.

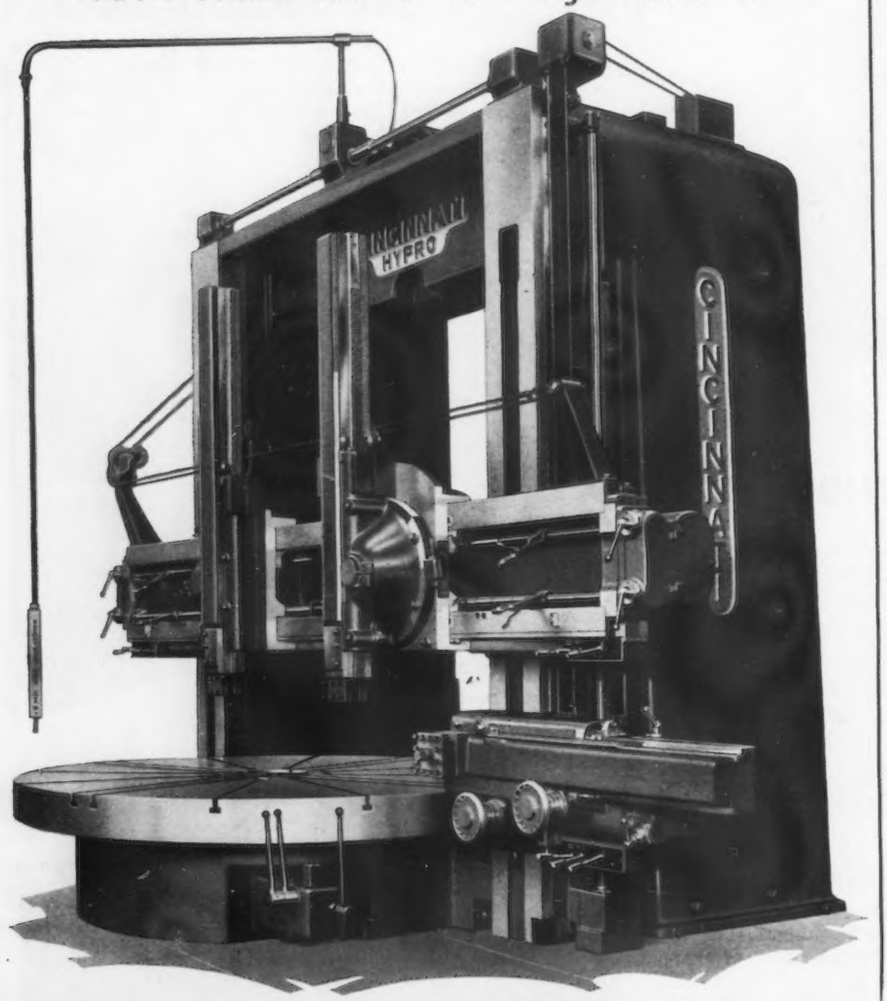
Alcan Bridges Contracted

• • • **Awarding of structural** steel contracts for nine bridges for the Alaska-Canada highway is reported to have been completed. The awards, totaling about 9000 tons, have been distributed among several United States fabricators and one Canadian company.

Cincinnati

HYPRO VERTICAL BORING MILLS

Are Precision Built for Your High Production



10′ Boring Mills—April 1943 Delivery

PLANERS · PLANER MILLERS · BORING MILLS

THE CINCINNATI PLANER CO.

CINCINNATI, OHIO

BORN TO KEEP A DATE *behind the enemy's lines!*

Official Photograph, U. S. Army Air Forces

"Objective below—cut loose!" Towlines go slack. Suddenly the gliders are on their own—huge, motorless craft floating silently to earth—each with a cargo of fighting men.

"Vertical envelopment" your military strategists call this new offensive tactic. And to make it work, aircraft plants the nation over are set up to turn out swarms of troop-carrying gliders—giant transports born to keep a date behind the enemy's lines.

At Taylorcraft, at Aeronca, at Piper, at Waco, at Pratt-Read and other plants that will make these gliders for America's new air-borne infantry, it is significant that modern paint-spraying systems by DeVilbiss have been installed to reduce the time required for wing doping and other finishing operations.

Today, in practically *all* war production, DeVilbiss Spray Systems are making possible better, quicker coating, painting and finishing jobs.

Tomorrow, when this war has been won, the new spray techniques and equipment we are developing to meet the requirements of war production will provide faster, more efficient finishing for your peacetime products.

THE DEVILBISS COMPANY • Toledo, Ohio

Canadian Plant: WINDSOR, ONTARIO

ARMY E NAVY

PROUD to have won the coveted Army-Navy "E" for excellence in war production, the men and women of DeVilbiss pledge to continue giving their all-out best—for Victory.

DEVILBISS
SPRAY SYSTEMS

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

COPYRIGHT 1943 — JONES & LAUGHLIN STEEL CORPORATION

DOLOMITE GUNS IN ACTION AT OPEN-HEARTHS HELP MAKE RECORD WAR-STEEL PRODUCTION

Skilled open-hearth men know the exact spots where the churning, boiling metal and slag begin eating away destructively at the dolomite hearths of their furnaces. Instantly, as each batch of steel is poured, these men swing into action with their dolomite guns. While the empty furnace is held at full temperature they shoot streams of the prepared dolomite at the white hot walls and bottom quickly building up the worn spots. Within minutes a new batch of fighting steel is in the making.

Minutes to these men are priceless — for, at the industry's present high rate of production, every

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

minute steel enough is produced to build five army tanks. America's steel mills are producing steel faster today than at any time in history — steels that are providing our fighting men with equipment and weapons to crush enemy forces and protect our own.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR

J&L STEEL

STONE AND STEEL

Dolomite a marble. This rock mineral used for "making bottom" in open-hearth steel furnaces is, in its original state, a limestone or marble rich in magnesium carbonate. It is found in extensive beds throughout eastern United States. The rock is quarried, crushed and screened for uniformity of size after which it is calcined by heating. In the white-hot steel furnaces this material fuses into a homogeneous hearth-lining resistant to destructive action of boiling steel and slag.

Stone of Heaven was the name for iron in ancient Egypt and Babylonia, indicating that the only pure iron was that obtained from meteorites, or falling "stars."

Higher than Tibet, on 60-mile wide ribbon of minerals 15,000 feet up in the Andes Mountains, Bolivian Indians work in tin and tungsten mines to help supply U. S. war effort with strategic materials.

To pry loose steel's secrets, J&L has Department of Metallurgy and Research with physical testing laboratories and staff that any university might envy. In these laboratories the inner story of steel is collected, classified, reduced to formulas. Many of these formulas are actually worked out in the J&L Pilot Plant, a steel works in miniature, complete with experimental open-hearth furnace, rolling mills and heating furnaces, first of kind in the industry, invaluable in today's urgency to produce new and better steels for war.

Locomotive built by jeweler, Matthias W. Baldwin, in 1831, for a tiny toy railroad in Philadelphia Museum, led to founding of great Baldwin Locomotive Works.

$5.00 to ship bushel of salt from Philadelphia to Pittsburgh was typical of freight rates in days of Conestoga freighters hauled across mountains by six-horse teams, doubled up to pull the broad-tired wagons up Tuscarora's forbidding barrier and over Laurel Mountain's rattlesnake-infested trails. Prior to 1840 there were years when 8,000 wagonloads of materials crossed the mountains carrying textiles, fine furniture and luxuries from the East, taking back iron bars, kettles, nails, hardware from Pittsburgh, budding young iron metropolis of "The West."

126 million pounds of hay, 88 million pounds of oats were purchased by the U. S. Army in 1913. In first World War an infantry division required 4,400 horses and 153 motor vehicles with 3,300 horsepower. Today that same infantry division would require 3,500 motor vehicles (160 types) with 400,000 horsepower — and no hay!

17-ton "bite" of iron ore can be taken out of cargo of lake ore boat by a single clam shell unit in the great Hulett unloaders with which most unloading docks are equipped.

Shipments of Machine Tools and Steel from U. S. Strengthening India

Washington

• • • **Lend-lease shipments** of machine tools, iron and steel and raw materials are strengthening the position of India as a source of supply for allied armies in that country and China, it was announced last week by Lend-Lease Administrator Edward R. Stettinius, Jr. The program for India, he pointed out, includes improvements in Indian harbors and greater exports of machine tools, other supplies to enable expanded production in the arsenals and factories of that country. At the same time, he said, the program will save shipping from the United States and England.

From its inception on March 11, 1941, to Jan. 1, 1943, lend-lease aid to India totaled $295,501,494. Two-thirds of the supplies were finished munitions with tanks and other vehicles heading the list; of the remaining one third, a majority were machinery and tools. Steps are being taken to supply more equipment for crowded Indian ports and to extend aid to the railroads which transport arriving cargoes to their destination.

Another step is the assignment of increased quantities of American steel to India at a regular quarterly rate. This steel will be used in the manufacture of armored vehicles, artillery and ammunition, rifles, guns, shells, air field construction, and railroad repair and expansion. It is planned also to continue shipments of manganese and molybdenum alloy needed for manufacture of steel within India. It is hoped to increase India's own steel output by 50 per cent.

India is the second largest producer of iron ore in the British Empire, exceeded only by the United Kingdom. The Tata Iron & Steel Co. in India is the largest single steel plant in the empire, and lend-lease is supplying it with machinery to expand its output of munitions and machine tools.

For normal times, India's steel supply is sufficient. But today India's railroads are showing the effects of having to carry huge volumes of freight estimated at 90,000,000 tons annually, and they must be repaired and rails replaced. India is also building ships and repairing them while expanding port facilities, constructing airdromes, barracks, hospitals and other military facilities for the United Nations' armies. She is expanding agricultural and mining facilities while maintaining essential industries which must be kept going in war or peace. Additional supplies of steel, machinery and other raw materials are needed for this work.

Lend-lease equipment scheduled for India's railroads includes locomotives, wheels, boiler tubes, signal and telegraphic equipment, lightning arrestors, axles, etc. India has some 40,000 miles of railroad track with three different gages.

Deliveries to India thus far have also included textile machinery, tires and tubes, electric bulbs, fire-fighting units, etc.

There have also been included oil, zinc, road rollers and tractors.

About 20 projects for the manufacture of munitions have been started with steel and machine tools shipped from the United States under lend-lease. These will be increased. India is turning out truck chassis in volume but needs spare parts. Munitions projects include expansion of production of field guns, anti-aircraft guns, machine guns, rifles, shells of various calibers, cartridge cases, fuses, fire-control instruments, cordite, and small arms ammunition.

Other lend-lease projects have been started to help India to produce for herself and, thus, reduce ship space used in transporting supplies.

Other lend-lease machinery will re-tread and recap the tires of military vehicles. These re-treading plants were to have been sent to China but, instead, will be used in India until the Burma Road is reopened. Then equipment for two factories, now scheduled for India, will be sent to China. The output of the factories in India meanwhile can be shipped from India to China by air.

India produces a considerable number of armored vehicles. In 1943, the total will be increased. Lend-lease will supply some of the armor-plate for these vehicles.

Lack of machine tools has been one of the most serious handicaps to India's increased production. Dr. Henry F. Grady, returning last year from a mission, said India could produce supplies for the entire Burma-China-India front if properly developed. Indian labor is plentiful, the only limiting factor being the lack of training in the use of industrial tools. Under lend-lease, the United States is sending large quantities of machine tools, a small part of which will be distributed among training schools while others are for use in plants now functioning.

As a base for the planes that fly supplies into China, India has additional importance. The American air force ferries its long-range bombers direct to India and uses airfields built by Indian workmen. Ten thousand workmen are employed to build a single airport. One large aircraft corporation in Bangalore, which is managed by Americans, repairs military planes and manufactures gliders. This plant last year repaired more than 400 planes. American engineers and production men are actually engaged in the management of several of India's industrial plants.

American-owned automobile plants in India turned out thousands of military vehicles, with chassis and parts shipped largely from Canada. India has nearly 300 textile mills.

Under the reciprocal lend-lease agreement with Great Britain, the United States has also drawn upon British stores of ammunition and food in India, and American ships are repaired and obtain fuel and supplies in Indian ports without payment, again under reciprocal lend-lease.

SOUTH PACIFIC LANDING FIELDS: Steel mat landing fields are seen being constructed by native labor for the U. S. Army Air Force in the south west Pacific. Fields here are first graded and filled with crushed coral.

Harris & Ewing

Briefly Told—

Shells Now Are Sized by Hydraulic Pressure; Army Lard Fights Rust

• **Critical material, time and labor are saved by a new method, developed by a commercial company, of sizing the body of a 4.2 chemical mortar shell by hydraulic pressure instead of turning it on a lathe, the War Department has announced. The process, known as hydro-sizing, is applicable to other types of artillery shells.**

Sizing the inside of a shell to exact dimensions by the use of 12 lathes on tubular steel is slow, highly skilled work, it was pointed out. In hydro-sizing, the operation is performed by a machine using hydraulic pressure. This method saves 24 per cent in materials, or 205 tons of metal on each 100,000 shells and reduces time required from six minutes per shell by the old method of 30 seconds per shell.

•

• *Conservation of critical materials, principally aluminum, formerly used in the manufacture of the Army field range and its components, has led to changes in methods of maintenance of these items, according to the War Department.*

Substitution of thinly enameled steel in the manufacture of range cabinets and of black iron in cookpots, bakepans, griddles and similar articles, requires cleaning with ordinary soap, and, if necessary, scouring powder not containing abrasives. Black iron items, on being put into service, and periodically thereafter, are thinly coated with lard or lard substitute, which is "burned in" by an hour's heat treatment in a medium oven, providing a smooth, glazed surface, resistant to rust.

•

• **More than 16,000 employees** at Caterpillar Tractor Co., Peoria, Ill., compiled a lost-time accident frequency of 10.3 cases per 1,000,000 man hours of work during 1942 for an all-time plant record, according to H. S. Simpson, company safety engineer. The best record was compiled during November when the frequency rate of accidents dropped to 6.7. In addition, 27 departments completed the entire year without a single lost-time accident.

•

• **Silent Hoist** Winch & Crane Co., Brooklyn, N. Y., is enjoying a double celebration in that it received the coveted Army-Navy "E" award for "outstanding producing of war materials" on the occasion of the firm's 25th anniversary.

•

• *At a recent meeting with WPB officials, the Fractional Horsepower Motor Industry Adivisory Committee called the critical shortage of commutators and ball bearings the chief handicap to production and the problem of obtaining these two and other components of small motors and generators was taken up in detail. A report was presented to the committee by a panel especially appointed to study the possibilities of conserving critical materials in the application of fractional horsepower motors. The report recommended the adoption of a conservation program to curtail the peace time practice of over-motoring.*

•

• **Roller-Smith Co., Bethlehem, Pa., recently honored 850 of its employees who have been with the company over five years. Seven "oldtimers" in this group were with the Whitney Electrical Instrument Co. or the Switchboard Equipment Co. which merged in 1908 to form the Roller-Smith Co.**

•

• **Distribution** by the Treasury of iron pennies, which is to begin soon, will be greeted by most people as a novel idea, but Thomas T. Read, Vinton professor of mining at Columbia University, points out that it is really a very old one, the first iron coins having been issued in China nearly 2000 years ago. Then, as now, they were introduced because of a shortage of copper supply. The cast iron coins used in China were so brittle that they were easily farctured, but that will not be true of ours, and the zinc coating they will have will give them a silvery look that will soon turn gray in use.

•

• *Cement requirements for construction purposes on continental United States will total approximately 108,000,000 bbl. in 1943, according to a WPB preliminary forecast. The forecast for 1942 was for 178,000,000 bbls.*

•

• **A majority of** industrial concerns from which the National Industrial Conference Board has obtained specific data on the subject, spent over 1000 man-days each in 1942 answering questionnaires and filing reports required by the goverment. Half of these firms found it necessary to devote 5000 or more man-days to this work, according to the Board. The highest figure reported was 18,000 man-days.

•

• **An Order-in-Council** has been passed which provides that certain ferro-manganese, imported into Canada, be exempt from the customs duty of 1c. per lb., or fraction thereof, on the manganese contained therein, and from the war exchange tax of 10 per cent. A further Customs memorandum has been issued stating that an amending Order-in-Council removes the restrictions respecting silicon content in ferro-manganese. The new order states: "Ferro-manganese imported from the United States or any other foreign country the products of which are subject to Intermediate Tariff treatment, be exempt from customs duty and from the War Exchange tax of 10 per cent ad valorem."

•

• *John R. Kimberly has resigned as WPB assistant director general and will return temporarily to work for his own company, the Kimberly-Clark Corp., Neenah, Wis., of which he is director of manufacturing. Mr. Kimberly has agreed to return to a position with WPB within two or three months.*

•

• **A new method of salvaging worn surface plates and at the same time providing a superior surface for inspection setups has been announced by the Lincoln Park Tool & Gage Co., Lincoln Park, Mich. The process consists of reworking the plate, hard**

PLASTIC IN SHIP BEARINGS: Salt water is said by Westinghouse Electric & Mfg. Co. to improve Micarta bearings, made of layers of fibrous material bonded together with synthetic resins.

Make safety simple for inexperienced men

If your men can be trained TO LET THE LOAD REST IN THE CURVE OF THE HOOK, NOT ON THE POINT—equipment will be preserved and accidents prevented. In most instances it's easy to follow this simple rule. But new men need to be told about this and other precautions which save lives, save money, and speed war production. We'll gladly supply information if you're interested.

The highest possible preference rating should be obtained and shown on orders placed for chain.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT, CONNECTICUT

In Business for Your Safety

chrome plating it and then lapping it flat. At present the work is limited to plates no larger than 18x24 in.

•

• **The United States steel** industry is drawing an increasing proportion of its chromium from the other Americas. Brazil, Cuba and Guatemala now supply about 10 per cent of the United States requirements for this metal, vital in the preparation of steel alloys, stainless steel, steel plating, production of cutting tools and many types of arms. Metallurgical grades of chromium, however, are still obtained mainly outside the Western Hemisphere, chiefly Africa. Despite the loss of the Philippines, the United Nations still have access to relatively abundant sources of chrome compared with the Axis.

•

• *Establishment of the Tank-Automotive Center in the Union Guardian Building at Detroit has saved monthly more than 450,000 passenger miles of railway travel; approximately 5000 man-hours of Army executive time per month; and has reduced the active force engaged in automotive ordnance production by more than 700, according to a recent release by the publicity office of the Center.*

•

• **Fred L. Eberhardt,** president and general manager of Gould & Eberhardt, Inc., Irvington, N. J., celebrated his 75th birthday recently at a dinner given in his honor by employees and friends. Mr. Eberhardt is well known in the machine tool industry.

•

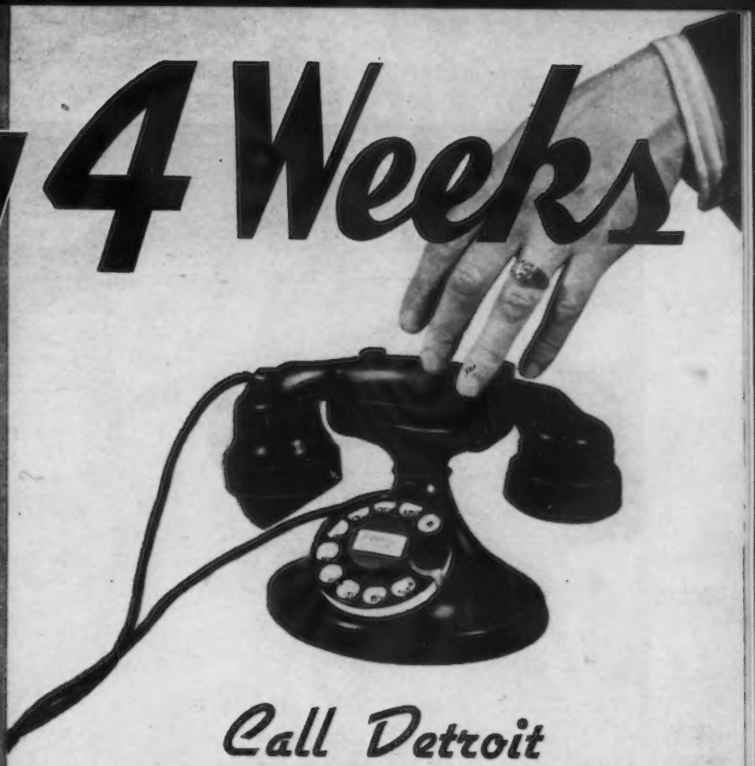
• **Intelligent planning by the War Production Committee of the Westinghouse Electric & Mfg. Co., East Springfield, Mass., plant results in saving more than four tons of vital war materials in one department every week. The average weekly conservation is 3300 lb. of sheet aluminum and 5300 lb. of sheet steel. This saving is accomplished chiefly by carefully assorting, according to thickness, all left-over ends resulting from shearing operations. The leftovers are then used for the fabrication of small parts.**

•

• **Construction of 42,000** housing units for war workers was completed during January, according to National Housing Administrator John B. Blandford, Jr. These units include both privately financed construction for war workers and projects financed with government funds. The January completions compared with a monthly average of approximately 33,000 during the fourth quarter of 1942.

Delivery 4 Weeks

TYPE "CO" SELF-OPENING DIE HEAD



Call Detroit
CHERRY 2216

Quick delivery of precision threading tools is something to make note of in these days of unsurpassed production in manufacturing plants.

Phone Murchey and you will get prompt and efficient service.

TYPE "BM" COLLAPSIBLE MACHINE TAP

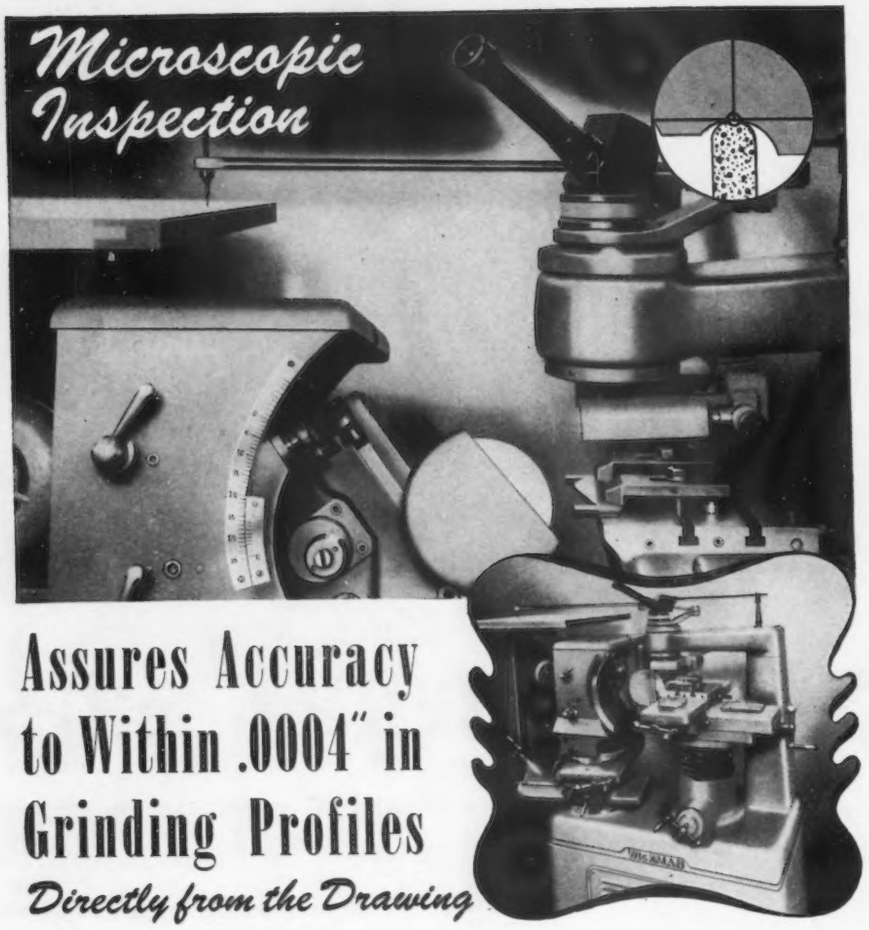
TYPE "G" SELF-OPENING DIE HEAD

No. 42 THREAD MILLING MACHINE

Murchey MACHINE & TOOL CO.

DETROIT, MICHIGAN

Murchey manufactures all types of Collapsible Taps, Self Opening Die Heads, Shell Tapping and Thread Milling Machines



Assures Accuracy to Within .0004" in Grinding Profiles

Directly from the Drawing

Illustrated above are the essential features of the Wickman Optical Form Grinder. At the upper left is a layout 50 times the size of the profile to be ground. The pantograph pointer is moved along the line of this layout.

The microscope is focused directly on the work and the grinding wheel. The microscope has cross hairs centered in a locating circle as shown in the drawing above. The intersection of these cross hairs corresponds to the position of the pointer on the long pantograph arm.

The grinding wheel is fed by hand to this point after each movement of the pantograph arm, and its exact position is observed through the microscope. As the long arm of the pantograph is moved from point to point on the layout, the intersection of the cross hairs moves correspondingly at the 50:1 reduction.

Straight and circular form tools (particularly carbide form tools) profile gages, templates, punches and dies and many other irregular parts can be finish ground on this machine to the highest degree of accuracy. Literature describing fully the Wickman Optical Form Grinder will be sent you immediately upon request.

WICKMAN OPTICAL FORM GRINDER

THE Wickman CORPORATION

15537 WOODROW WILSON
DETROIT, MICHIGAN

Absentees Strafed by Admiral Emory S. Land

• • • **Shipyard absenteeism took a rough drubbing from Admiral Emory S. Land, chairman of the Maritime Commission, testifying before the House Naval Affairs Committee this week. Land said that "illegitimate absenteeism" in shipyards was costing the country the equivalent of 100 Liberty ships in lost time and recommended Congressional action on a "work or fight" type of legislation rather than an order from a government agency. He based his opinion that this would be effective on the fact that 40 per cent of our 1-million shipyard workers are eligible for the draft. Unexplained absenteeism was placed at 6.4 per cent of total absenteeism by Admiral Land.**

Students of Columbia War Engineer Classes, 79% Women

• • • **Out of 584 persons** registered at Columbia University for Engineering, Science and Management War Training courses, given in cooperation with the U. S. Office of Education, 458 are women. Seven of the 12 courses have 100 per cent women enrollment, Columbia reports. More than 75 per cent of the carefully selected applicants successfully complete the courses. In the Engineering Aide classes, the only full-time course, 120 students are trainees employed by Grumman Aircraft Corp., Bethpage, L. I.

Among the other courses being given for prospective or present war plant employees are physical metallurgy, electrical principles and measurements, metallographic laboratory practice and mechanical drafting.

ASA Asked to Plan Industrial Standardization

Detroit

• • • **The Automotive Council** for War Production has proposed that the American Standards Association undertake an intensified standardization program for all American industry, to accelerate the development of a uniform procedure in specifying fits and tolerances and methods of gaging inspection and gage control.

Actual development work will be conducted by the American Standards Association under the direction of a special wartime committee embracing all American industry.

Handle with care — but hurry!

YOU DO BOTH WITH THE SLING WITH THE DOUBLE-S* GRIP

** the sling that handles loads with* **both** ***SPEED and SAFETY***

Take a good look at the construction of the Macwhyte Atlas Wire Rope Sling. This sling, "hurrying" production of war materials in plants all over the U.S., provides unquestioned safety because of its special construction. Two

endless wire ropes, each of opposite lay, are spirally woven throughout. The result is a perfectly balanced sling body. In addition to safe and speedy materials handling, Macwhyte Atlas slings have many advantages:

• *Light-weight, flexible, easy to handle* • *Positively non-spinning* • *Kink-resistant* • *Non-damaging to loads* • *Balanced construction of left-&-right lay endless ropes* • *Store in small space* • *No splices to wicker* • *Terminate in natural loop-ends* • *L-O-W final cost*

"Keep 'em rolling"... but do it with SAFETY:

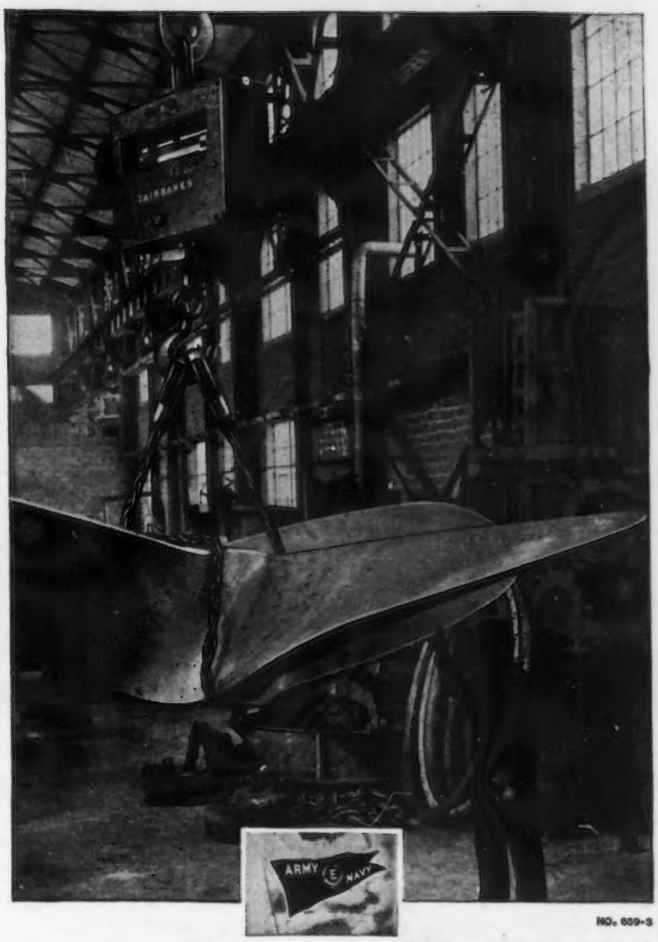
*Speed Plus Safety

MACWHYTE ATLAS Braided Wire Rope SLINGS

"The sling with the perfectly balanced *body"*

MACWHYTE COMPANY, 2911 Fourteenth Ave., Kenosha, Wisconsin. Manufacturers of wire rope to meet every need — "ATLAS" Left-&-Right Lay Braided Slings — "DREW" flat braided wire rope slings — "MONARCH" Standard rope slings and grommets — Stainless Steel Wire Rope — Monel Metal Wire Rope — Aircraft Cable, Aircraft Tie-Rods, and "Safe-Lock" Swaged Terminals.

MILL DEPOTS: Pittsburgh · Chicago · Fort Worth · Portland Seattle · San Francisco. Distributors throughout the U.S.A.



NO. 659-3

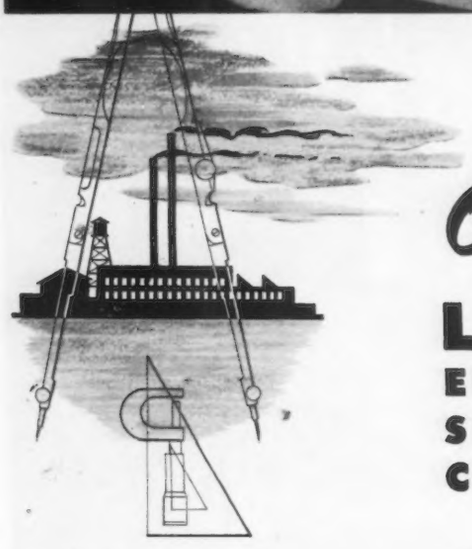
CONSULT MACWHYTE ON YOUR SLING PROBLEMS

For years we have been making many types of slings, for many kinds of jobs. We're busier today than ever before... supplying Macwhyte Atlas Slings to war production plants all over America.

Ask us for suggestions on how to move your loads fast WITH safety. Plan your sling needs as far in advance as possible. Tell us the kind of work to be done; we'll suggest the type of sling to do it.

Take special care of your slings. By so doing you can make them last longer, help yourself, and aid the war effort. That's what YOU want; that's what your country asks of you.

Time and materials are vital. On sling problems, consult Macwhyte. Save both time and materials.



One of the

LARGEST ENGINEERING STAFFS IN THE COUNTRY . . . . .

. . . . . ready to help you with any engineering task you may have—to utilize present equipment to better advantage—to design new tools, dies, fixtures for altered production routine—to make new plant layouts—to diagnose your equipment in relation to anticipated production now and later—and in many other ways bring greater efficiency to your operation.

We shall be glad to discuss these matters with you at anytime you suggest.

ENGINEERS
DESIGNERS
CONSULTANTS

PIONEER ENGINEERING AND MANUFACTURING CO.

19649 JOHN R
DETROIT, MICH.

Ten Executives Named to OPA Steel Tube Committee

Washington

• • • **Ten executives** with wide experience in the steel tubing industry were invited by Price Administrator Prentiss M. Brown on Monday to serve on a Steel Tubing Advisory Committee to counsel with OPA on pricing problems of the industry.

Those invited to serve are:

J. Ireland, Republic Steel Corp., Cleveland; R. Lawson, Summerill Tubing Co., Bridgeport, Pa.; E. A. Livingston, Babcock & Wilcox Tube Co., Beaver Falls, Pa.; W. F. McConnor, National Tube Co., Pittsburgh; W. A. McHattie, Michigan Seamless Tube Co., South Lyon, Mich.; Charles E. Miller, Michigan Steel Tube Products Co., Detroit; W. B. Moore, Timken Roller Bearing Co., Canton, Ohio; F. J. O'Brien, Globe Steel Tubes Co., Milwaukee; H. E. Van Huffel, Van Huffel Tube Corp., Warren, Ohio, and Aaron Waines, Ohio Seamless Tube Co., Shelby, Ohio.

Tool Scheduling Altered

Washington

• • • **A new method** of scheduling machine tool deliveries was established by WPB order E-1-B as amended, it was announced by WPB on Tuesday. The major changes are confined to the scheduling of deliveries on purchase orders from service purchasers as defined in the order. As in the original order, 75 per cent of the total production of machine tools is set apart for delivery to service purchasers. Seven service groups are named. Each service group's quota is arrived at on the basis of the ration of each group's backlog of purchase orders to the total backlog for all service groups. Backlogs are measured at certain specified dates and orders must bear preference ratings of A-10 or higher.

Adjusting Casting Prices

Washington

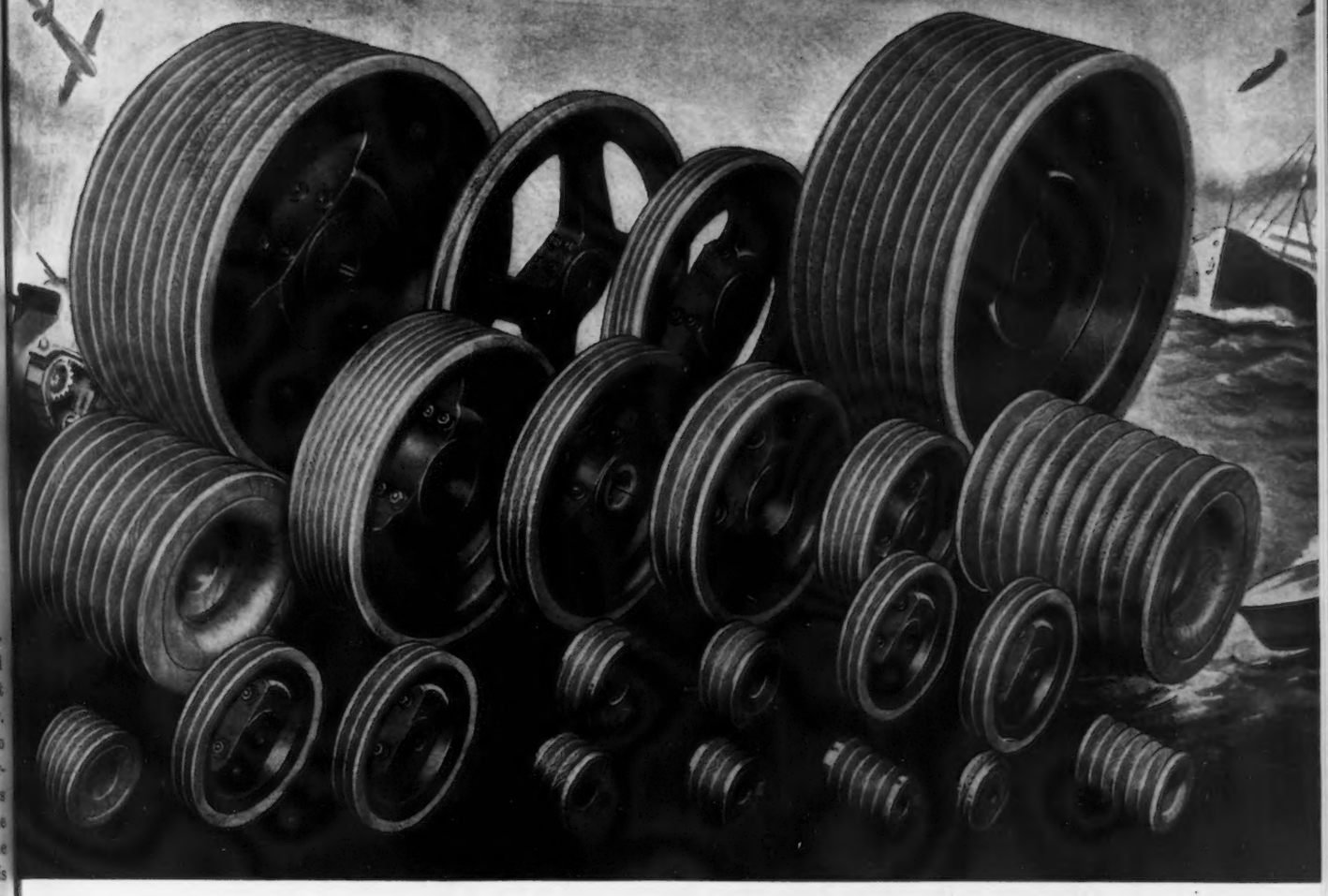
• • • **OPA on Tuesday** set up criteria for sellers of gray iron castings who wish to apply for adjustment of maximum prices. Sellers must show:

1. That maximum prices for castings are below production costs or are inadequate to justify continued production.

2. That the castings are necessary to the war effort, and that he has entered into or proposes to enter into government contracts or subcontracts.

3. That unless adjustment is granted he will stop or refuse to undertake production of the castings and that as a result the purchaser would be materially handicapped in his operations.

Put All Your Power in the Job . . .
Throw More Scrap Into the Fight By Using
DODGE VICTORY WOOD SHEAVES



DODGE VICTORY WOOD SHEAVES with Dodge D-V Belts get more battle power out of horsepower – save critical materials and machines for use where they can do the most for Victory.

Dodge VICTORY WOOD SHEAVES save metals and vitally needed steel scrap and transmit power just as efficiently as metal sheaves where flywheel effect is not required. They are made from carefully selected kiln dried hard maple and are accurately grooved and finished on special machinery designed for this purpose.

The same inherent characteristics which have been responsible for the successful performance of Dodge Victory Wood Split Pulleys over a period of sixty years are found in the Victory Wood Sheave. They will withstand shock — operate at high rim speeds and are firmly fastened to shaft by means of wood bushings.

The Dodge line of Victory Wood Sheaves is complete and includes a type for every service. They are light in weight — easy to install and low in price.

Your local Dodge distributor can give you prices and complete information on Victory Wood Sheaves. Depend upon him for power transmission appliances to help you put *all* your power in the job of producing more for VICTORY.

DODGE MANUFACTURING CORPORATION
MISHAWAKA, INDIANA, U. S. A.

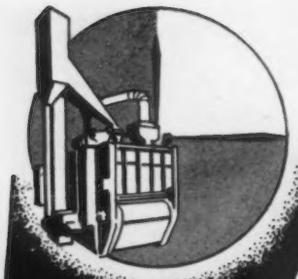
BUY
U. S. WAR
BONDS
FOR
VICTORY

DODGE
MISHAWAKA

THE RIGHT DRIVE FOR EVERY JOB

V BELT
THE DOMINANT DRIVE OF INDUSTRY

UT *ALL* YOUR POWER IN THE JOB



Airless
WHEELABRATOR
Cuts Forging Cleaning Job
From 5 Hours to 15 Minutes

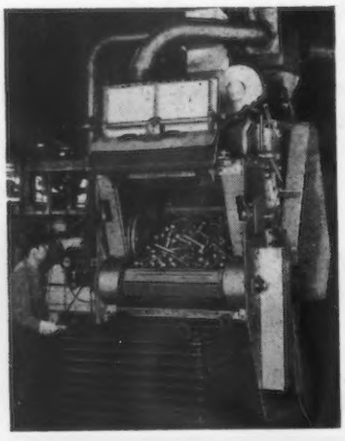
★ ★ ★ WHEN the history of World War II is written, much will be said of the speed of American production . . . and the decisive part it played in overwhelming a foe that had been arming for at least a decade.

Thousands of advanced engineering ideas are at work right now to make this epic drama possible. Among these is the Wheelabrator airless method of abrasive blasting—the metal cleaning process that "works miracles with minutes." Take this example of cleaning forgings, for instance:

Federal Drop Forge Co. says:

"The time factor has been greatly reduced. For instance, on a certain type of forging that we are making, which represents better than 50% of our work, under our old method we placed these forgings in the tumbling barrel for three hours to remove the excess scale. Then they had to be unloaded and carted over to the pickling house, where they were put in the pickling tank for another two hours. With the handling and all it made about five hours' operation, and we were not always successful in removing the scale. Now we perform this same operation in fifteen minutes and we get a beautiful, clean, polished job."

This is not just an isolated example, by any means. It is typical of what more than 2000 users are doing by Wheelabrating. And your cleaning problem can be handled just as speedily . . . we would be glad to have a chance to show you how.



AMERICAN
FOUNDRY EQUIPMENT CO.
Blast Cleaning and Dust Control Engineers

510 S. BYRKIT ST., MISHAWAKA, IND.

World's Largest Builders of
Airless Blast Equipment

War Plant Cost, Post-War Business Problems Surveyed

• • • **Plant expansion** financed by government agencies from June, 1940, to June, 1942, totaled 1887 projects and cost $13,000,000,000, the Twentieth Century Fund reports in a manual "Wartime Facts and Postwar Problems," to be issued this month. Private commitments for war plant expansion totaled 8686 projects, costing $3,000,000,000. During the entire decade of the twenties the nation invested only $20,000,000,000 in manufacturing plant and equipment, and during the thirties, $14,000,000,000, the Fund points out.

Among the postwar problems to be faced by business, as discussed in the manual, are: Conversion and disposal of industrial war plants, monopoly versus competition, relaxation of government domination, antagonism toward business, foreign rehabilitation and development, and new industries and products.

•

• • • **Construction projects** having a total cost of $1,066,990,976, which were examined and found to be essential to the war effort, have been approved by the WPB in a little more than four months since last Oct. 22. Proposed projects estimated to cost $82,137,313 were disapproved. Stop orders on projects already underway having a total cost of $1,306,352,395 have been issued since Oct. 23, 1942.

T. W. Martin Chairman of Newly Organized War Program

Birmingham

• • • **A War Program** of the Associated Industries of Alabama has been organized here with Thomas W. Martin, president of Alabama Power Co., chairman. The committee plans to work closely with manufacturing plants of the State on war production and manpower problems. Members of the committee include:

Robert Gregg, president of the Tennessee Coal, Iron & Railroad Co.; H. A. Berg, president of Woodward Iron Co.; George Connors, president of Connors Steel Co.; Ben Davis, vice-president of Sloss-Sheffield Steel & Iron Co.; E. I. Evans, Southern district manager of Republic Steel Corp.; J. W. Porter, president of Alabama By-Products Corp.; George Morrow, Jr., president of Goslin-Birmingham Mfg. Co.; Merrill Pratt, president of Continental Gin Co.; L. N. Shannon, vice-president of Stockham Pipe Fittings Co.; E. E. Michaels, Birmingham manager of Chicago Bridge & Iron Co.; R. C. Stobert, vice-president of Hardie-Tynes Mfg. Co., and Walker Reynolds, vice-president of Alabama Pipe Co.

OF EC&M MASTER SWITCH MINIMIZES FATIGUE *aids* PRODUCTION

OPERATORS like the *exceptionally smooth* operation of this EC&M Master Switch (Type NT). It lessens fatigue—an even greater consideration today than ever before, with more and more women entering industry.

Furthermore, this switch, in combination with magnetic contactor control, produces a *quick response* in motor-driven machines. It gives *more accurate control* of machines and helps a lot in those inching operations.

An important feature, too, is its narrow width allowing several of these EC&M Master Switches to be lined up side by side—*and all easy to reach!*

Bulletin 1182-1 completely describes this Master Switch for use with EC&M Bulletin 921 Crane Control or Bulletin 925 Mill Auxiliary Control. Write for your copies to-day.

THE ELECTRIC CONTROLLER & MFG. CO.

CLEVELAND ★ OHIO

CMP *Clarifications, Interpretations,*

• • • **In several moves,** all aimed at clarifying the CMP operational picture, WPB last week offered a standardized method of certifying CMP delivery orders, clarified the classifications of steel products with regard to Class A or B products and re-emphasized the fact that after July 1, priority ratings will have no validity for CMP materials.

The shortest and most easily understood of all CMP regulations to date was announced March 2 with the issuance of CMP Regulation 7 which provides an optional standard form of certification to be used to validate any delivery order under CMP. Use of the standard form will eliminate the necessity for placing several different forms of certification on orders, a circumstance that might easily arise under the varied requirements of the several CMP regulations. However, the earlier forms required under CMP Regulations 3, 4 and 5 may still be used in the appropriate circumstances.

Official text of the regulation follows:

A certification in substantially the following form may (but need not) be used in lieu of any other certification required by any CMP regulation to be endorsed on a delivery order or to be furnished therewith:

The undersigned purchaser certifies, subject to the penalties of section 35 (A) of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the item(s) ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order.

Such certification shall be signed manually or as provided in Priorities Regulation No. 7.

If the applicable CMP regulation requires an allotment number or symbol, preference rating or other identification to be included in a certification, such identification shall be placed on the delivery order if the above form of certification is used.

In a clarification of the proper classification of steel products as to CMP class, J. L. Haynes, director of the Building Materials Div. of the

• • • **At an important WPB-sponsored meeting** in the Middle West several weeks ago on the subject of CMP (particularly as it affects the aircraft industry), a number of topics of general interest were discussed, including the following concerning maintenance, repair and operating supplies:

QUESTIONER: I have a question in connection with tools, dies, jigs and fixtures in which we have a large program, probably upward of a million dollars. Under this new program of MRO supplies you can do it two ways. My contention, from the beginning, has been that we ought to put that material on 4A and hitch it to the program, in order to have it properly coordinated and available when you want to use it, either by yourself or the vendors.

We used to make most of it, and now, due to this manpower shift, a great deal of it is going to be put out with vendors. If you put it out with vendors, a lot of them do not know much about the CMP operation, and if it goes through the MRO, they may or may not get the material. My contention is it ought to go on the 4A.

CHAIRMAN: Let us cut this question down into some segments. You are talking specifically about tools, dies, jigs and fixtures.

QUESTIONER: In other words, they are all a part of the preparatory arrangement to make your product.

CHAIRMAN: The statement in the Reg. is to the effect that we are considered as part of the MRO Supplies; as part of the accounting practice.

QUESTIONER: If you own them.

CHAIRMAN: It doesn't make any difference. They are MRO regardless of whether you make them yourself or buy them from somebody.

QUESTIONER: But what I meant was that ordinarily, in your accounting practice, it would be your property which you would use to make the parts with, and you could keep the tools, but in these contracts they are required of the whole contract, as they are charged to the contract.

CHAIRMAN: We have worked very hard on an interpretation of that, and it is hard to make an interpretation because the areas are flexible. You can get a small jig or you can get a big one. Now, in accounting, it may be the practice, up to a certain point, to consider them as MRO, and, on a very large one, to consider it as capital equipment which is going to be charged off over a period of time. I think that the differentiation comes in there. If you are charging off or amortizing your tools, dies, jigs, fixtures and gages against a product schedule, then it is MRO. If you are depreciating it, as you would your factory, over a long period of time, it is capital equipment. I realize that that is not a very exact definition, and I think that each company has to work that out for themselves. The contract says jigs, dies and fixtures shall be considered as operating supplies.

AN OFFICIAL: May I comment on that? I assume that you have made your own tools in the past and you are now going out and buying them. I do not think that makes any difference.

QUESTIONER: I want to draw this point. These are not tools which we use to build products with to sell to somebody else. These are tools, dies, jigs and fixtures which are part of the contract. After the contract is through they are charged on the contract and that is the end of it. We do not have the tools. It is just the same as the product, you may say.

THE OFFICIAL: Let me give you this picture. In that same price that you charge for that contract you include all of your overhead items which are also still remaining or used up in the process of the job, and which you either have left or which you have charged off, and the customer has paid for it. Therefore, I do

Feature CMP Moves this Week CMP

Construction & Utilities Bureau issued a bulletin covering, among other things, the general classification of fabricated structural steel as a Class A product.

Other points stressed in the bulletin stated that manufacturers of Class A products shall file applications for allotments only when and as called for by the Claimant Agency or other consumer for whom they make their products. Allotments for Class A products sold for use as maintenance, repair and operating supplies or delivered to distributors should be obtained on Form CMP-4B. If you are manufacturing Class A products for use in a Construction or Facility project you should file a CMP-4A application with your customer.

If you will require controlled materials for the manufacture of a Class B product (or your subcontractors will require same for making Class A products to be incorporated in B products) you must file a CMP-4B application with WPB. This should include only your requirements for Class B products as defined in the Official CMP Class B Product List. Broadly speaking, fabricated structural steel is considered a Class A product and miscellaneous and ornamental iron and steel items fall in the classification of B products.

In a further effort to clear the confusion existing with respect to the use of allotment numbers and priority ratings under CMP, H. G. Batcheller, director of the WPB Steel Division, notified all users of steel that after July 1, priority ratings would have no validity and that between April 1 and June 30 the steel mills would fill orders on priorities, in sequence, only after they had completed the production required under CMP allotments.

Mills are not expected to accept orders for delivery in excess of the total they can deliver by the scheduled dates. This as previously outlined in a steel production directive has been set at 110 per cent of capacity.

While all of these instructions have already been issued in one form or another, the WPB has seen fit to reemphasize them for the benefit of some in whose minds some confusion on the subject still exists.

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not think there is any material difference as to whether or not you collect for them in your price or whether you do not collect for them in the price. That part of it does not resolve the question as to whether it is an expense item or a cost of sales item, if we might put it that way. The only differentiation—and we take this one first and then go to the other one that you have later—the only differentiation is that under your income tax regulations you do not write off the expense of making tools in a year to profit and loss. Even though you may keep it in a holding account and charge it off against the product, you have a gain over a period of two or three years. For income tax purposes, you are charging that off as an expense. If you do that, then it is a Maintenance, Repair and Operating Supply, under the MRO provisions. If, however, you set up each tool and depreciate that tool, and when you throw it away you write off what is left and set up the next tool as an item of capital equipment, in that case the depreciation of those items would come under the supervision of the income tax rules and regulations. Then it becomes an item of capital equipment, and only in that case. I think the majority of the companies handle it in the former manner and not in the latter manner. Regardless of whether you put it into profit or loss during the current fiscal year, and therefore they would be MRO.

Now, then, when you are buying these from somebody else, and they are going to order material from the mills, presumably to process them, in which case they would sell them to you, your order would be placed on the supplier under the designation MRO, and the manufacturer of our MRO items would file a 4B form to get the material. Therefore, when you are working from that standpoint, I think you are sure enough of getting the material; that you do not have to put it in the A chain.

QUESTIONER: That is the point, because so many of these toolmakers are small individuals—small people—and, collectively, it is a large amount of material, but my point is that this is not, I believe, in the category you are talking about. These are the tools and fixtures, and all that you have made to make that program with, and when that program is through that is on the contract cost—cost plus, and you are all through with it.

AN OFFICIAL: But you do not know the length of the program. You know the one you have now, but presume we study that from the idea of extending your contract, and if you took your action on this segment, which seems to you to be a complete contract, and then you were to get a fill-in, or an extension on that contract, then you have balled the thing up again, you see. Under this system, it will last over full duration.

QUESTIONER: Handling the MRO will be all right as far as getting the material.

AN OFFICIAL: You can buy the material yourself, under MRO, from the mill and give it to him—to a small supplier. I do not think it is a recommended practice, except as an emergency situation. Follow pretty closely the Regulation and you will be on the safe side.

QUESTIONER: I would like to inquire about special sizes of alloys. We have had difficulty getting them. In fact, we have had to use substitutes. Now in the ASU bills of materials are you attempting to determine the total quantity of different sizes and take steps to see they would be made?

AN OFFICIAL: That is correct. We are going in that general direction. We are going to work it out like we did the old tube situation, where we had odd sizes, none of them being mill runs. It looks a little like about 35 per cent of the total can be grouped to make economic runs at the mill.

Only the complete removal of ALL smut, oil, grease, scale and dirt from metal parts . . . whether of iron, steel, aluminum, brass, zinc or copper . . . provides the indispensable CHEMICALLY CLEAN surfaces that assure uniformity and proper adherence of corrosion-resistant BLACK oxide finishes.

Correct Surface Preparation Gives You the SUCCESSFUL START Essential To Satisfactory Black Finishing

Whatever black finishing process you use on war supply items, fast-working, specially designed Oakite degreasing and de-scaling materials speed surface preparation, give you the successful start essential to any BLACK oxide finish . . . help you obtain better results . . . keep costs low.

Send For This
FREE BOOKLET

Contains formulas, methods for the preliminary surface preparation of all metals before black oxide finishing. Send for your copy of this NEW booklet just off the press.

If you have any trouble applying black finishes on any of the following work, let us help you.

Buckles
Wire Products
Piston Rings — Magnetos
Firearms
Telescopes — Radios
Aircraft & Engine Parts
Bicycles — Cameras
Screw Machine Products
Carburetors — Spark Plugs
Stampings

Manufactured only by
OAKITE PRODUCTS, INC., 30H Thames Street, NEW YORK, N. Y.
Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE MATERIALS METHODS SERVICE — FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS — **CLEANING** FOR EVERY CLEANING REQUIREMENT

CMP Exports for Quarter Clarified

New York

• • • **Holders of export** licenses for CMP materials in both their basic forms (as listed in Export Bulletin 70, par. 6) or as Class A products will operate under a temporary arrangement for second quarter deliveries. Means are granted for appeal from low ratings which might remove the material from second quarter production, and an elimination of new license applications is permitted through an announcement made by BEW in Export Bulletin 78.

License holders for CMP materials in their basic forms which cannot be scheduled for production in the first quarter and possibly not in the second quarter due to too-low priority ratings now assigned may appeal to the Office of Exports for higher ratings which will bring the material under consideration for production under CMP in the second quarter.

This appeal is made in the form of a letter in quadruplicate sent to the Operations Branch, Office of Exports and should give specific data.

Some licenses outstanding authorize the export of Class A products scheduled for production during the second quarter. Consideration will be given to bring the second quarter and subsequent production of controlled materials for such products within the provisions of CMP without filing for a new license.

Allotments extended by BEW in these cases will be issued on Form CMP-4A. Where controlled materials for the production of Class A products for export are not needed by March 31, the procedure should not be used. Likewise, persons who have already filed CMP-4A should disregard the procedure.

Components Scheduled by Instrument Makers

Washington

• • • **Manufacturers of electrical measuring instruments, whose deliveries will be scheduled after April 1 by WPB, have started to schedule their own orders for critical components, thereby improving the production of their suppliers.**

The WPB learned from the instrument makers that their chief problems resulted from late deliveries of fine wire, springs and magnets.

Testing Steel for Hardness

Physical Testing of Finished Wire

Microscopic Examination of Steel

A Section of Union Wire Rope Research Laboratory

★Another 6 Months of Star Performance In War Production

BIRTHPLACE OF TOUGHNESS

Out of some 4000 steel formulas, relatively few are suited to wire rope and other products using special wire. From long years of experience, Union Wire Rope engineers and metallurgists have determined upon a steel formula for each type of Union Wire Rope, as well as for high carbon wire for other special uses.

To be certain each heat meets specified analysis, steel is examined under a powerful microscopic photo and scanning machine (see photo at top right). In minute detail its micro structure and inherent grain size are analyzed. From this analysis is determined the controlled heat-treatment and the subsequent processing operations it is to be given in the mill to secure wire meeting the exact specifications desired.

Samples of the wire then are brought back into the elaborate Union Wire Rope laboratory. First it is subjected to hardness tests under a delicate pendulum machine (see photo at top left) and its Brinell hardness determined. Then in a group of six physical testing machines (see center photo above) the actual tensile strength, torsional values, fatigue life, ductility and hardness of wires of all grades and sizes are checked. Here, before the wire is stranded, the ultimate tensile strength, toughness and durability of Union Wire Rope is pre-determined.

Many other research activities are constantly carried on in Union Wire Rope's laboratory. Although not pictured here, there are scientific research machines for testing wire coatings by the salt spray, Preece, strip test and wrap test methods.

Here tough wire is born for our own stranding machines and for special service in the products of other manufacturers.

UNION WIRE ROPE CORPORATION
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B-43

USERS OF HIGH CARBON STEEL WIRE NOTE!
Subject to war conditions only, our facilities are such as to afford you a dependable source of supply for high carbon steel wire. Our engineers are prepared to submit interesting proposals on your specifications and requirements.

union Wire Rope

"THE ULTIMATE LOW COST WIRE ROPE"

GRAND RAPIDS

COMBINATION DRILL AND TAP GRINDERS

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Sharpens Taps, 2, 3 and 4 Flute, Right or Left Hand. Sizes #6 to one and one half inches.

Sharpens Drills, 2 and 3 Flute, Straight or Taper Shank. Sizes from one eighth to one and one half inches.

"Sharp Drills and Taps Cut Holes in Rising Production Costs."

Other Combinations Also Available

•

Write for complete descriptive literature

GALLMEYER & LIVINGSTON CO.
200 Straight Ave. S.W.
GRAND RAPIDS MICH.

NEWS OF INDUSTRY

Small CMP Orders Are Defined Further

• • • **The CMP Division** of WPB last week issued CMP Bulletin 18 which further defined small orders and specifies when the symbol SO may be used with an order as provided in CMP Regulation No. 1.

The small order procedure may not be used for orders for Class A products if the quantity of any controlled material required to produce the Class A product exceeds the quantity specified in CMP Regulation No. 1. In such cases, the purchaser of the Class A product must ascertain the quantities of each controlled material required to make the product and shall make an allotment to enable the manufacturer of the product to obtain all of the controlled materials required.

A manufacturer making Class A products under the small order procedure may use the symbol SO to purchase Class A components incorporated in his Class A product. In those cases where he groups his SO's to purchase the "A" components and as a result of such grouping the aggregate quantity of controlled materials required to produce all Class A components required to fill all of the related small orders exceeds the small order quantities, he should so advise his supplier so that his supplier will not question the validity of his order under the regulation.

•

Copper Order Amended To Fit Under CMP Setup

Washington

• • • **In order to avoid** confusion, Copper Order M-9-a has been amended to place the control of warehouse sales of brass and wire mill products entirely under CMP Regulation No. 4.

Under this regulation, warehouses distributing brass and wire mill items have been permitted since Feb. 15 to fill authorized controlled materials orders, or orders bearing preference ratings of AA-5 or higher for 500 lb. or less of any item to any one destination at any one time. No more than 2,000 lb. of any one item may be delivered to a customer during a calendar month. All orders must be accompanied by a prescribed certificate, signed by the person placing them.

Previously, Order M-9-a permitted the delivery of brass and wire mill products only on orders bearing AA-5 or higher ratings. Prior to issuance of CMP Regulation No. 4, no quantity restrictions were placed on deliveries by warehouses.

This quick-detachable "YANKEE" VISE saves time and labor

It's milled on sides, front end and base for interchangeable and accurate positioning on face plate or machine bed. Quickly detachable from its swivel base, it can be transferred from bench to machine for drilling, milling or tapping — and back to bench again without removing work from jaws. Quickly and easily converted into milling, drilling or tapping jigs. Hardened steel block with V-shaped grooves (furnished with vise) holds round or irregular shapes securely. That's why "Yankee" Vises speed production. That's why they are in such demand in modern machine shops producing for Victory.

★ ★ ★

"Yankee" Vises are made in four jaw widths and two styles. No. 991—1½"; No. 992—2"; No. 993—2¾"; No. 994—4". Same sizes with detachable swivel base feature are Nos. 1991, 1992, 1993, 1994. Order from your supply house or write North Bros. Mfg. Co., Dept. IA-311, Phila., Pa. Support orders with priority ratings whenever possible.

"YANKEE" TOOLS
make good mechanics better
North Bros. Mfg. Co., Phila., U. S. A.
Established 1880

Aluminum Division Issues CMP Setup

• • • **A. H. Bunker,** director of the Aluminum and Magnesium Division has issued a circular letter to all aluminum fabricators outlining the procedure to be followed in obtaining supplies after March 31.

Under CMP, the letter states, all aluminum fabricators will secure authorization from the proper Fabrication Section of the WPB Aluminum and magnesium Division to obtain supplies of aluminum for fabrication in accordance with Regulation 1. This applies to integrated as well as non-integrated fabricators. Distributors will apply to the Warehouse Section of the Division for this authorization.

The authorization number received will consist of the symbols AM followed by a six digit number. The first four digits are a company identification and should be carried on all orders or requisitions. The last two digits represent the month of delivery and can be figured by a consecutive count of months from January, 1942. Special emphasis is placed on use of this complete number on all forms as delivery cannot be made without its identification. For orders already placed, the supplier should be notified of the number to be carried.

•

WPB Reports Last Minute CMP Changes

• • • **Rolling mills** and allied equipment have been removed from the Class B product list and become Class A products, according to an announcement in CMP Bulletin 19.

• • • **An AA-1** rating for MRO supplies when operating under CMP April 1, has been extended to manufacturers of "switch gear" which has been defined as electric motor control equipment, knife and enclosed switches panelboards and distribution boards, small air circuit breakers, aircraft switches and circuit breakers. The Electrical Control Section of the WPB General Industrial Equipment Section made this announcement.

• • • **Interpretation** 1 to CMP Regulation 4, issued this week, places distributors of automotive replacement parts under CMP as a "distributor" or "warehouse."

• • • **Interpretation** 1 to CMP Regulation 1, issued last week, states that there shall be no discrimination by mills in rejecting orders which cannot be filled by the scheduled date. This

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☆ In receiving this joint citation of the Army and Navy, the management and personnel of The Weatherhead Company recognize that the award carries with it not only an honor but a grave responsibility. We will discharge that responsibility by making every effort to increase the flow of vital parts for 'planes, tanks, trucks, ships, combat cars, radios and munitions which Weatherhead plants have been turning out at the rate of millions every day!

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Branch Offices: Detroit, Los Angeles, New York and St. Louis

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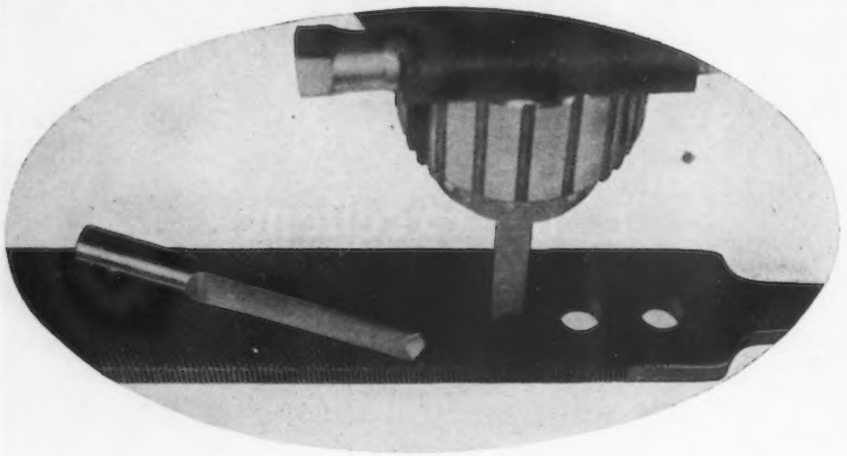
WILL DRILL YOUR OWN SAMPLES



AT THE A. S. T. E. MEETING

Look for our working exhibit—watch us drill hardened steels and plastics—at the A. S. T. E. Meeting, Mechanics Hall, Milwaukee, March 25th to 27th.

Bring with you a sample of your own—any hardened steel or plastic part—and watch us drill it with a "HARDSTEEL" drill. If the piece is too big, bring a print and let's talk it over. We'll show you how to step up production, cut rejects, lower costs by the use of "HARDSTEEL."

Look for us in Spaces 107-8 and don't forget your sample.

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YOU HARDEN IT—WE'LL DRILL IT

"HARDSTEEL"
DRILLS · REAMERS · TOOL BITS · SPECIAL TOOLS

Recent Shifts in Changing WPB Picture

T. P. Wright, famed civilian aeronautical engineer, given sweeping powers as director of Aircraft Resources Control Office, to coordinate schedules, handle manpower situation, act as aircraft claimant agency under CMP.

J. A. R. Moseley, Dallas, Texas, named new director of Smaller War Plants Corp.

William J. Priestly, New York, resigned as head of WPB alloy steel branch to return to Electro-Metallurgical Co.

Ralph J. Cordiner made WPB vice-chairman.

J. A. Krug named vice-chairman in charge of material distribution and chairman of requirements committee. Krug will also continue to serve as War Utilities director.

Donald D. Davis is new vice-chairman for operations, and Curtis Calder becomes executive assistant to C. E. Wilson.

Robert W. Wolcott, president of Lukens Steel Co., made special assistant in the WPB iron and steel branch to handle problems of procurement, allocation and use of iron and steel scrap.

move absolves the mills of much of the obligation of specially servicing customers.

• • • **Two limits** imposed by CMP Regulation 4 governing the size of warehouse shipments of copper have been approved by WPB to raise the amount from 500 lb. in one order and 2000 lb. in one month to 2000 lb. in one order of condenser tubes, rod, tube, pipe, sheet, strip or welding rod. For wire the minimum is raised to 1000 ft. in sizes 4/o and larger.

• • • **CMP Regulation No. 3** was clarified last week to establish those supplies which may be purchased by a manufacturer for resale to round out his line. These were pointed out as being fabricated articles which a manufacturer buys for resale to holders of his equipment for use in maintenance and operation of the equipment.

$4-Million Projects Halted

• • • **Construction** projects having a total cost of $4,161,181 were stopped during the week ending Feb. 19, according to WPB. The projects were halted through the revocation of preference ratings in conformance with the policy of curtailing construction not directly related to the war effort.

WPB Rebuilding Warehouse Stocks

Washington

• • • **Steel warehouses** have been given WPB permission to acquire restricted quantities of any product in excess of established quotas for the first quarter of 1943. This action was taken by amending Order M-21-b to facilitate the rebuilding of stocks before the introduction of CMP.

Under the amended order warehouses that were unable to maintain inventories because of inadequate 1942 receipts may accept deliveries of any product classification until March 31 provided that the deliveries in excess of quotas do not exceed the deficiency on all product classification for last year.

Other changes made by the amended order are as follows:

1. A definition of "minimum carload" to mean a carload weighing not less than 40,000 lb.
2. To permit warehouses to accept deliveries from idle and excess inventories, plate quotas are increased from 100 per cent to 135 per cent of the base tonnage in California, Oregon and Washington; and from 100 per cent to 125 per cent in all other states.
3. The quotas for wire rods are eliminated.
4. Warehouses purchasing products commonly known as "seconds" — steel products invoiced as less than prime quality—are permitted to obtain their quotas from any producer.

•

WPB Adds to Hog Fence, Barbed Wire Specifications

Washington

• • • **Production of heavier** gage barbed wire and an additional style of wire fence needed to meet the farm production goals of the Department of Agriculture will be permitted under Schedule 3 of Limitation Order L-211, as amended Mar. 1 by WPB.

Under the new specifications, 2-point barbed wire can be made in two styles, while 4-point wire can be made in one style. Previously, manufacture of only one style of 2-point wire was permitted.

The revised schedule also provides for the production of an additional style of hog and cattle fence. Wire netting and flooring not designed for farm use are nevertheless covered by the established specifications.

Galvanizing of wire by limiting use of zinc coating is restricted to the weights established by federal specifications, as outlined in the schedule. Producers are urged to use lead instead of zinc coatings wherever possible.

The current production of this organization is geared, first, to supply needs of the armed forces and of manufacturers producing for them.

However, that very definite policy erects no bars to thoughts of after the war production. Keep that in mind when you plan against the time when peace will come.

Today for war, tomorrow for peace, wire is the business of PAGE—and always has been.

Welding Wire: For Stainless Steel in a range of analyses that makes certain the deposit will equal the Stainless you weld. Also electrodes for all other steels. Handled by local PAGE Distributors.

Shaped Wire: Diameters to ⅜". End section areas to .250 sq. inch. Oval, half-round, square, rectangular, keystone, triangle, octagon, hexagon, channel, flat, round.

Stainless Wire: As above.

General Wire: Spring Wire, Bond Wire, Telephone Wire, etc.

Again, remember, for Victory Production or Peacetime plans:

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FOR WIRE

PAGE STEEL AND WIRE DIVISION
Monessen, Pa., Atlanta, Chicago, New York, Pittsburgh, San Francisco

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
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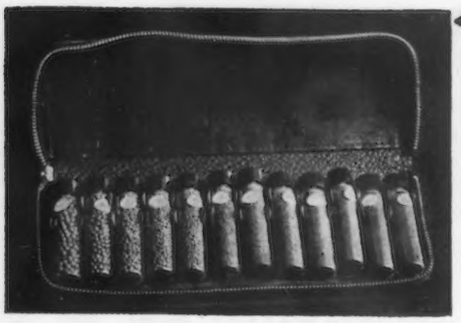

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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

•

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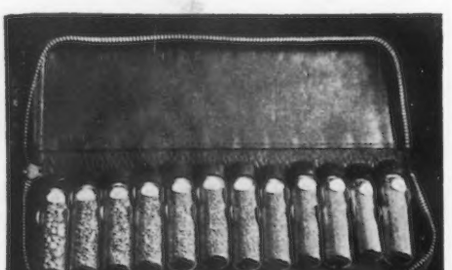
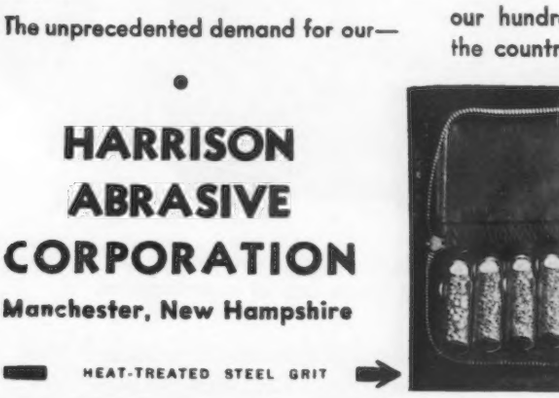
Manchester, New Hampshire



HEAT-TREATED STEEL GRIT

PERFORATED METALS



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ARE ESSENTIAL IN TIMES OF WAR AND PEACE

They are used in the manufacture of airplanes, battleships, explosives and in many important and essential industries such as the processing of grain, food products, petroleum, coal, etc. We make all sizes and shapes of holes to meet the most exacting conditions.

The Harrington & King PERFORATING Co.

5657 FILLMORE ST., CHICAGO **114 LIBERTY ST., NEW YORK**

Air Cooled Engines Are Limited to 42 Basic Models

Washington

• • • **Production of all** air-cooled engines, except those for aircraft and motorcycle propulsion, is controlled by Order L-254 issued March 4 by the WPB. The order limits the number of engine models which will be produced. It also establishes standardization and simplification practices which will materially decrease the number of replacement parts which may be required by the armed services and essential civilian users. On and after March 15, the effective date of Order L-254, the manufacture or assembly of any air-cooled engines not listed in Schedule A attached to the order is prohibited. The schedules cover 42 basic engine models manufactured by 12 companies.

•

L-252 on Valves Corrected

• • • **Order L-252,** which reduces the permitted number of types of gate, globe, angle, cross and check valves has been revised to correct errors in the original version issued Jan. 23. It was intended to exempt valves, cast or forged—before May 1. The words "or forged" are inserted in subparagraph (b) (1) (i) which now reads: X X X X "The bodies or bonnets of which were cast or forged before May 1, 1943." To correct a printer's error, Part 3, subparagraph 6. (b) of the appendix "½" molybdenum" is changed to "½ per cent molybdenum." In specifying seating materials for valves, Part 3, subparagraph 6 (c) omitted the phrase, "same material as body," which is now inserted.

•

Floor Machines Relaxed

• • • **The WPB** has been empowered to authorize special production of floor finishing and floor maintenance machines and industrial vacuum cleaners. The authorization was given in Order L-22, as amended. It is intended only to take care of special situations, and to meet requirements of the armed forces and defense industries.

•

L-154, Schedule 3, Revoked

• • • **Because the use** of certain metals in the manufacture of feed water heaters is adequately controlled under the provisions of General Limitation Order L-172, WPB on Mar. 1 revoked Schedule III of L-154 issued Nov. 21, which established similar control over the same items.

Time Extended to Apr. 1 For Higher Casting Prices

• • • **In order to give** the nonferrous foundry products industry additional time to bring its bookkeeping into line with maximum prices provided in revised Maximum Price Regulation No. 125, effective Feb. 1, OPA postponed from March 1 to April 1 the date on which sellers of nonferrous castings must stop billing their purchasers at higher prices specified in earlier contracts.

The postponement was provided in Amendment 2 to Revised Maximum Price Regulation 125 — Nonferrous Foundry Products—effective March 1, 1943. It does not change earlier requirements that final settlement for products billed at the higher contract prices must not be made at prices higher than the maximum prices established Feb. 1. Adjustment of prices to the new maximums must be made within 30 days after the billing or invoicing.

•

Copper Limited in Auto Parts

• • • **Restrictions on** the use of copper and copper base alloy products in the manufacture of automotive parts are extended by Limitation Order L-106 as amended Mr. 5 by WPB. Under the terms of the order these critical materials may not be used in the manufacture of any automotive parts (including replacements parts) except 15 specified items, and then only to the extent indicated. Thirteen of these were also exempted in the original order, issued in May, 1942.

•

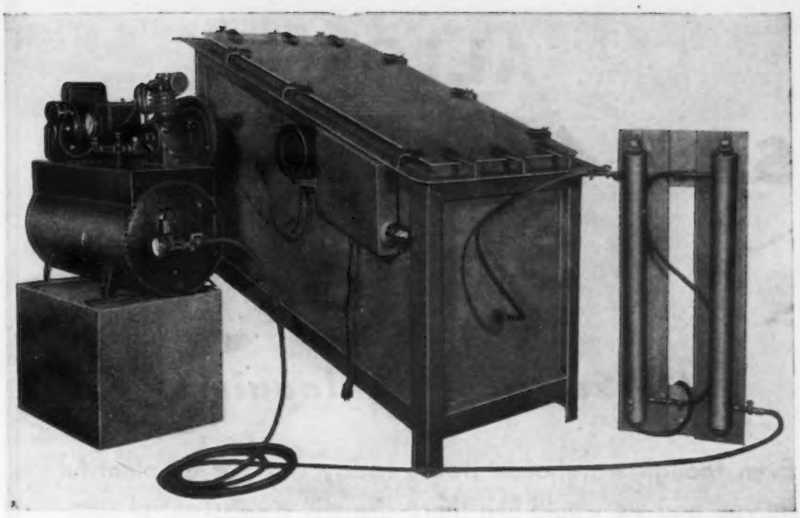
Cast Valve Flanges Urged

• • • **To reduce the demand** for steel flanges, Schedule 2 of Order L-42 has been amended to permit greater use of gray cast iron and malleable iron in pipe flange manufacture. Order L-252 permits malleable iron bodies for several pressure classes of valves. The malleable iron screwed and lapped joint flanges listed in Schedule 2 will become available for the malleable iron body valves permitted under L-252.

•

PD-615 for Heat Exchangers

• • • **WPB has announced** that prospective buyers of heat exchangers must now apply for "authorization to purchase" on the form, Revised PD-615. The new form requires complete information regarding the delivery promises made by manufacturers in order to determine delivery dates.



The MUNNING SALT SPRAY TEST EQUIPMENT
for determining Resistance to Corrosion

The salt spray method is the most practical for ascertaining the value of electro deposited articles by testing for corrosive resistance of the base metal and permeability of the plated coating.

This Munning Improved Model shown above conforms to army, navy and aeronautical specifications, and is recommended for producing accelerated corrosion tests to similate service behavior.

Let us give you further details. Write or 'phone.

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"HERCULES" RED-STRAND WIRE ROPE
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You Can Depend On "Hercules" (Red Strand) Wire Rope

Highlights of Quality
1. Acid Open-Hearth Steel Wire
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4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

• • Results are what count, and the performance record of this wire rope continues to make and hold friends.

There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

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WIRE ROPE MAKERS — ESTABLISHED 1857
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Even though warehouse stocks today are not as plentiful as you and we would like there are still a substantial number of sizes in a variety of analyses available for immediate shipment. We will do everything within our power to help you make the guns and tools and ships and planes and tanks which will win the war.

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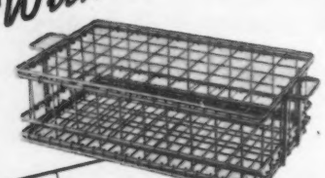
Faster "UNIT HANDLING" *With* WIRE BASKETS

● Union Steel Wire Baskets are being used in war plants to organize production—to handle complete lots in a basket as single units. The object is speed. Stacking type baskets also conserve floor space. Let us see what can be done to speed up some department of your business. Write for illustrated bulletin.



Cap Basket for 75 mm. caps

Shell Case Basket for 40 mm. cases

Heat Treating Baskets

Shell Basket for 75 mm. shells

Wash Basket for 3" Cartridge Cases

Wire Parts for War Use

These are only a few of the many wire parts being used for war purposes. Write, Wire or Phone (Albion, No. 147) for quotations or further information on Wire parts or products (woven, welded or formed).

UNION STEEL Products

UNION STEEL PRODUCTS COMPANY
442 Pine St., Albion, Michigan

PRIORITIES

M-39 Places Cobalt On Strict Allocation Basis

Washington

• • • **WPB on Monday** amended Order M-39 to place cobalt on a straight allocation basis. Deliveries are permitted only on the specific authorization of WPB. Persons desiring an allocation must file Form PD-581 and 582. Deliveries of 25 lb. of contained cobalt to any person in any one month or delivery of any amount to RFC subsidiaries may be made without specific authorization.

•

Warehouses' Orders

• • • **The latest in** a series of instructions to warehouses covering the procuring of steel for the second quarter was issued March 1. The amount which may be ordered for delivery in that period is 83 per cent of the base tonnage of each product classification. Not over 150 per cent of base tonnage of any product classification and type for any calendar quarter may be ordered, and the total of all product classifications is limited to the 83 per cent figure. The rules govern orders placed not only on producers, but on others, such as those who have material listed with the Steel Recovery Corp.

Dow Magnesium Plant Among New DPC Contracts

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

Dow Magnesium Co., Midland, Mich., to provide additional plant facilities in Texas at a cost in excess of $335,000, making a total commitment of more than $62,000,000.

Babcock and Wilcox Tube Co., Beaver Falls, Pa., to provide additional equipment for a plant in Pennsylvania at a cost in excess of $35,000, making a total commitment of more than $960,000.

Fairchild Aviation Corp., Jamaica, N. Y., to provide additional equipment for a plant in New York at a cost in excess of $65,000, making a total commitment of more than $450,000.

Aerojet Engineering Corp., Pasadena, Cal., to provide plant facilities in California at a cost in excess of $150,000.

Upper Columbia Logging Co., Hood River, Ore., to provide equipment for operations in Washington and Oregon at a cost in excess of $100,000.

Se-Ling Hosiery Mills, Inc., Nashville, Tenn., to provide additional equipment for a plant in Tennessee, at a cost in excess of $20,000, making a total commitment of more than $85,000.

E. I. Dupont de Nemours & Co., Wilmington, Del., to provide equipment in a plant in New Jersey at a cost in excess of $75,000.

General Electric X-Ray Corp., Chicago, to provide equipment for a plant in Illinois at a cost in excess of $68,000.

Acro Electric Co., Cleveland, to provide additional equipment and machinery at a plant in Ohio at a cost in excess of $12,000, making a total commitment of more than $50,000.

This Week's Priorities and Prices

Nonferrous casting maximum prices which were to become effective March 1, will not be effective until April 1 under Amendment No. 2 to Revised Maximum Price Regulation No. 125. (OPA-T-636)

Grey cast iron and malleable iron will be used to a greater extent in the production of pipe flanges under amended order L-42. (WPB-2726)

Steel producers have been notified that, under the new scheduling procedure of WPB, the mills are expected not to accept orders for steel in excess of the capacity they can deliver on the scheduled dates.

Brass and wire mill product warehouse sales have been placed under CMP Regulation No. 4, in an amendment to order M-9-a. (WPB-2725)

For copies of above announcements Address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)

■ ■ ■

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

Priority Regulations:

No. 11...Interpretation (3-5-43) covers use of Production Requirements Plan ratings authorized for maintenance, repair and operating supplies to purchase cranes, monorails and similar equipment.

"M" Orders:

M-9-a...Amended order places control of warehouse sales of brass and wire mill products entirely under CMP Regulation No. 4 (3-4-43).

M-15-b...Amendment (3-5-43) removes certain types of rubber from restrictions of order.

M-21-b...Amended order permits acquisition of restricted amounts of any product in excess of established quotas for the first quarter of 1943 (3-6-43).

M-227...Amended order places allocations of copper chemicals on a quarterly instead of a monthly basis (3-5-43).

"P" Orders:

P-19-h...Order broadens application of preference ratings on construction projects (3-1-43).

"L" Orders:

L-22...Amended order permits manufacture of specified quantities of industrial vacuum cleaners (3-2-43).

L-42...Amended order permits use of grey cast iron and malleable iron in pipe flange manufacture (3-3-43).

L-64...Amended order places new restrictions on sizes and designs of caskets and burial vaults (3-4-43).

L-106...Amended order permits use of copper for components of certain automobile parts (3-5-43).

L-154...Schedule III revoked (3-1-43).

L-170...Amendment (3-5-43) authorizes production of specific items of farm machinery and equipment.

L-211...Schedule III permits production of heavier gage barbed wire and an additional style of wire fence (3-1-43).

L-248...Order permits manufacture of commercial dishwashers and repair parts (3-2-43).

L-252...Amendment corrects errors made in the original order (3-2-43).

L-254...Order controls production of all air-cooled engines, except for aircraft and motorcycle propulsion (3-4-43).

CONDENSED SPECIFICATIONS OF

WPB APPROVED MODELS

KRANE KAR SWING BOOM TRACTOR CRANE

IN ACCORD WITH LIMITATION ORDER L-112

SPECIFICATIONS	MODEL A*	MODEL AX	MODEL AY
Capacity { At 5 ft. from Front Axle / At 3½ ft. from Bumper... / At 10 ft. from Front Axle.....	5000 lbs. / 2500 lbs.	10,000 lbs. / 5,000 lbs.	20,000 lbs. / 10,000 lbs.
Boom, Telescopic	12 to 18 ft. (a)	12 to 18 ft. (a)	{ 12 to 18 ft. or / 19 to 31 ft. (a)
Speed, Traveling { 4 Speeds Fwd / 1 Speed Rev.	Up to 15 mi./hr. / 2 mi./hr (b)	Up to 12 mi./hr. / 1¾ mi./hr. (b)	Up to 10 mi./hr. / 1¼ mi./hr. (b)
Hoisting, Hook Speed { High Gear / Low Gear	50 to 80 ft./min. / 30-50 ft./min.	35-55 ft./min. / 20-35 ft./min.	15-25 ft./min. / 10-15 ft. min.
Boom Topping, Horiz. to Max. Vertical	8 Seconds	10 Seconds	12 Seconds
Boom Swing, 180 Degrees, High Gear	15 Seconds	20 Seconds	25 Seconds
Engine, For Travel & Crane Operations	25-50 H-P Gasoline (c)	25-50 H-p Gasoline (c)	25-50 H-P Gasoline (c)
Width, over-all { Solid Tires / Pneumatic Tires	5 ft. 6 in. / 7 ft. 2 in. (d)	6 ft. 2 in. / 8 ft. 5 in.	7 ft. 6 in. / 9 ft. 3 in.
Length, (exclusive of Boom) { Solid Tires / Pneumatic Tires	10 ft. 8 in. / 11 ft. 7 in. (d)	11 ft. 2 in. / 12 ft. 5 in.	13 ft. 5 in. / 14 ft. 8 in.
Height, over-all (with Boom lowered) { Solid Tires / Pneumatic Tires	7 ft. 0 in. / 7 ft. 4 in. (d)	7 ft. 7 in. / 7 ft. 11 in.	8 ft. 10 in. / 9 ft. 5 in.
Weight, complete with Std. Equipment	15,000 lbs.	21,000 lbs.	35,000 lbs.

*Production of Model A has decreased in favor of Model AX. In line with WPB recommendations for a minimum of types, Model A may be discontinued for the Duration. Model AX should be considered instead.

(a) One piece booms and other boom lengths are also available, if required.

(b) An Auxiliary Reverse Transmission for high speed traveling in reverse, is available, if specified; provides all forward speeds also in reverse.

(c) Diesel Engine of same size is available, if specified.

(d) Pneumatic Tires used for Model A are NOT WPB Approved Standard Size; Model AX should therefore be considered instead.

Krane kar

SILENT HOIST WINCH & CRANE CO., 851 63RD ST., BROOKLYN, N.Y.

Opportunity to Stretch Compressor Capacity

An inspection of your air operated equipment may show many places where reduced pressure will mean better performance, in addition to more efficient use of available air compressor capacity. With Hannifin pressure regulating valves, working pressure can be quickly and easily adjusted to the needs of each machine, and to different operations on the same machine.

Exclusive piston-type design provides large volumetric capacity and sensitive, accurate control of working pressures. Adjustment can be made over the entire working range from 150 lbs. down to provide any reduced operating pressure needed.

Three standard sizes, ⅜, ½, and ¾ inch, for use on initial pressures up to 150 lbs. Write for Bulletin 56-A.

HANNIFIN MANUFACTURING COMPANY
621-631 So. Kolmar Ave., Chicago, Ill.

HANNIFIN

Pressure Regulating VALVES

PERSONALS

• **Charles G. Atkin** has been elected president of the Osborn Engineering Co. Formerly vice-president in charge of engineering for the H. K. Ferguson Co., Cleveland, Mr. Atkin was in charge of considerable industrial design and construction having handled the expansion programs for such concerns as Addressograph - Multigraph Corp., National Gypsum Co., Glidden Co., F. E. Myers & Sons Co., National Carbon Co. and others. At the same time **Kenneth H. Osborn** has been elected secretary and **T. T. Hubbard** has been elected vice-president and treasurer.

• **Standish Backus**, president of the Burroughs Adding Machine Co. for the past 23 years, resigned because of ill health. He will be succeeded by **Alfred J. Doughty**, executive vice-president and a director of the company. **L. V. Britt**, vice-president, has been named to succeed Mr. Doughty, and **John L. Stewart**, treasurer, became vice-president and treasurer.

• **Charles H. Manion**, vice-president in charge of operations of the Follansbee Steel Corp., Pittsburgh, has been elected a member of the board of directors. Mr. Manion joined Follansbee in 1919 as a designer while the Toronto, Ohio, plant was being built. From 1920 to 1921 he was maintenance engineer and subsequently efficiency engineer for both plants of the company, later becoming chief engineer, which position he held until July, 1940, when he was elected vice-president in charge of operations at both the company's Toronto, Ohio, and Follansbee, W. Va., plants.

CHARLES H. MANION, vice-president in charge of operations, Follansbee Steel Corp., Pittsburgh.

• **H. Tom Collard** of Protective Coatings, Inc., Detroit, Mich., has contracted to represent the Mitchell-Bradford Chemical Co., Bridgeport, Conn., in the state of Michigan, the far West and in certain other localities. Mr. Collard has appointed **Harold Forton** as technical engineer.

CHARLES G. ATKIN, president, Osborn Engineering Co., Cleveland.

• **F. D. Jones** has been named to the position of assistant advertising manager for the Copperweld Steel Co.'s Warren, Ohio, division. He will handle the advertising for Copperweld's alloy tool, stainless, and special steels.

• **W. A. Patterson**, president of United Air Lines, has been elected to membership on the advisory board of the Institute of Aeronautical Sciences, Inc.

• **Earl L. Young**, vice-president in charge of production, Laminated Shim Co., Glenbrook, Conn., has retired. Mr. Young has been with the company 22 years.

• **B. H. Quackenbush** has been made assistant sales manager of Foote Brothers Gear & Machine Corp., Chicago. In 1933 he joined Foote Brothers, and in 1936 he was placed in charge of the contract division, handling large machinery contracts.

• **Harry D. Byers** has been named treasury manager for the Pacific Coast District, Westinghouse Electric & Mfg. Co. He will have charge of departmental activities in an area comprising all or parts of 10 western states, Alaska and Hawaii.

• **John B. Klumpp** has been elected to the board of directors of the American Meter Co.

• **Vern R. Drum** has formed Vern R. Drum and Associates, production engineers, headquartered in the New Center Bldg., Detroit, after resignation from a post as consultant on manufacturing problems for the Cleveland Ordnance District. Previously he was vice-president in charge of manufacturing at Willys-Overland Motors, Inc.

• **T. F. Patton**, general counsel for Republic Steel Corp., has been elected a director of the corporation. Mr. Patton has been associated with Republic since 1936.

• **Ray J. Moths**, associated with the W. H. Pipkorn Co., Milwaukee, for the last 20 years, has resigned to become president of the Expansible Steel Truss Co. of the same city.

• **E. C. Eaglen** has been appointed to the position of coordinator of post war planning for the Oliver Iron & Steel Corp., Pittsburgh. Mr. Eaglen was formerly sales engineer of pole line materials for Oliver, and has had many years of experience in production, engineering and sales.

E. C. EAGLEN, coordinator of post war planning, Oliver Iron & Steel Corp., Pittsburgh.

• **George W. Burpee** and **Bradley Stoughton** have been elected to the board of directors of Lukens Steel Co., Coatesville, Pa. Mr. Burpee and Mr. Stoughton replace **W. Perry Tyson** who becomes associate counsel of Lukens Steel Company and its subsidiaries, and **Robert B. Haines, III,** who, because of pressure of other obligations, withdrew as a candidate for re-election to the board.

• **Henry J. Hogue,** general superintendent at the Wasmer Bolt & Screw Corp., has been advanced to the position of vice-president. Simultaneously, the company has announced the advancement of **Joseph Auer, Jr.,** former assistant superintendent, to the position of general superintendent, and also the appointment of **James S. Rignall** as company secretary.

• **Frederick B. Geier,** president of the Cincinnati Milling Machine Co., has been elected to the board of American Rolling Mill Co.

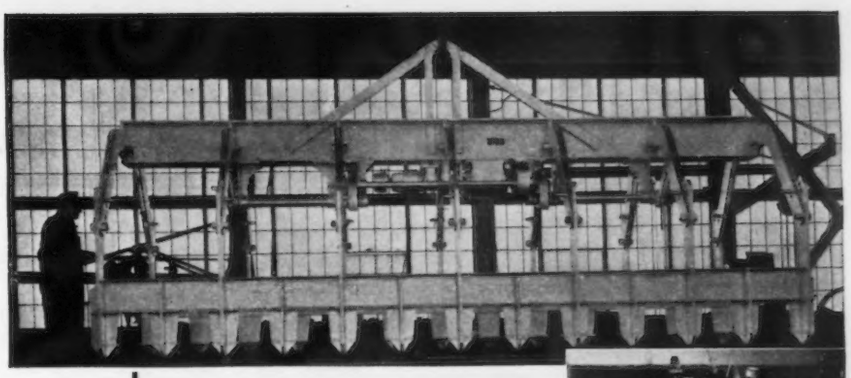
• **Thomas P. Archer,** formerly assistant general manager of the Fisher Body Division of General Motors, has been elected vice-president in charge of General Motors Corp.'s manufacturing and real estate staffs.

• **Folke Richardz,** an engineer for 17 years with the Westinghouse Electric & Mfg. Co., has been appointed manager of engineering in the company's gearing department at the Nuttall Works, Pittsburgh. He succeeds **S. L. Crawshaw,** who has resigned.

• **Fred C. Smith** has been appointed chief metallurgist of Tube Turns, Louisville, Ky. From 1936 to the date of his present affiliation with Tube Turns, Mr. Smith was employed by Carnegie-Illinois Steel Co. at Chicago, in the capacity of field metallurgist. Prior to that he was plant metallurgist for the International Harvester Co., at the Fort Wayne and Chicago plants.

• **Malcolm Morgan** has been appointed superintendent of blast furnaces and coke plants in the Southern district operations of Republic Steel Corp. and **Daniel Hernan** has been named superintendent of transportation at the corporation's Gulfsteel Works, Gadsden. At the time of the appointments, both Mr. Morgan and Mr. Hernan were in the Youngstown offices of Republic.

• **Kenneth A. Harmon,** vice-president of the Wico Electric Co., West Springfield, Mass., has succeeded **Edward L. Stoughton,** president, as general manager.



A 1-man "crew"

. . . with a C-F Sheet Lifter you can pick up, carry and stack, loose or bundled sheets without bending or denting the thinnest stock . . . can stack it closer and higher, greatly increasing your storage capacity . . . can handle the longest and narrowest strip or the widest, most flexible sheets without "rippling" edges.

C-F Sheet Lifters are self-contained units, accurately balanced and counterbalanced so that patented "elbowed" arms are operated easily (by hand chain or motor push button). Sizes for any crane, monorail or hoist. Types for any working situation.

Write for Bulletin SL 21

CULLEN-FRIESTEDT CO.,
1303 S. KILBOURN AVE. CHICAGO, ILLINOIS

It keeps Maintenance DOWN

Let this useful booklet show you how to get special hoist equipment for your needs at "standard equipment" cost. *Modern Materials Handling Magic* shows WHY Reading Hoists provide easy maintenance. Write on your company letterhead for your copy.

● From dye houses like this to steel mills and paper plants, *Reading Electric Hoists* are helping to keep production up every hour of the day. Many *Reading Hoists* installed 10 or 15 years ago are *still* helping to speed production and keep maintenance down.

● When you are faced with a tough handling problem — or when you want "standard equipment" that will do the job well — it will pay you to rely on Reading's engineering ability.

Reading Chain & Block Corporation, 2101 Adams St., Reading, Pa.

READING CHAIN HOISTS · ELECTRIC HOISTS OVERHEAD TRAVELING CRANES

MACHINE TOOLS

. . . Sales, Inquiries and Market News

Increased Output Laid to Modernized Machine Shops

Cleveland

• • • **Recent reports** by machine tool builders that production during the first two months of 1943 has been exceptionally high have been interpreted in various ways, one of which was that even in the face of present manpower shortages builders have still been able to procure sufficient skilled help to boost production. While this may be quite true, there are various factors that are in no way related to the manpower situation that materially affect machine tool output.

The prime factor in this regard has been the modernization of plants and equipment of machine tool builders. Going into the war, many companies commenced work on war contracts with equipment and machinery that were old, slow and often quite inefficient. As the demand for machine tools increased there was a proportionate increase in the demand for tool building facilities in the form of both new plants and new machinery and the demands were supplied.

Consequently as this expansion program was completed in the individual plants, the companies gradually disposed of their old equipment and machinery and placed in production new and modern facilities. This naturally meant much higher production per tool or of plant equipment than was obtained formerly, and producers now are getting considerably more production from less men.

It is unfortunate from an industry standpoint that machine tool needs have suddenly tapered off in the face of the new and greatly expanded productive capacity, and it is a situation that practically every builder is considering quite seriously. What to do with present productive machine tool capacity is the major topic of discussion at board meetings, staff meetings, over the luncheon tables and wherever machine tool plant executives meet.

At the present time there are substantial purchases being made of small tools, but orders for larger machine tools and major pieces of equipment are becoming scarcer. The March 1 deadline set by C. E. Wilson, of the WPB, for ordering machine tools needed during the remainder of the current year caused only a ripple in the buying pond. It is estimated that the actual effect of the order was that there was less than a 10 per cent increase in orders over what would have been the normal trend during the period from Feb. 6 to March 1, or about one month preceding the deadline.

This condition is indicative of the rather widespread feeling among manufacturers that while they are willing to go along 100 per cent with what is wanted by WPB, the trouble and difficulty of establishing estimates for this equipment in the face of the possibility of war contracts not being renewed or being granted for a product completely foreign to the present operations was not only impracticable but almost impossible.

It is felt that while cooperation between WPB and the manufacturer is essential, it is the various government agencies that want the materials and products turned out by the manufacturer and if these agencies want them badly enough, they will see to it that adequate and proper machine tools will be available to the producer.

A stabilization in war contracts both in the form of new ones and renewals has been indicated during the past few weeks by the fact that new orders for machine tools have been of a definite pattern and cancellations have been dropped to almost nothing. The wave of cancellations precipitated by government cancellations of certain types of war contracts and refusal to renew expiring contracts because of the changing emphasis of war demands at the beginning of the year has apparently passed its peak and machine tool business has steadied down again.

o o o

Used Machine Tool Dealers Oppose OPA Heavy Tool Price

New York

• • • **Unanimous opposition** to OPA's proposed weight basis for resale prices of used machine tools weighing over 18,000 lb. was registered by members of the Machine Dealers' National Association's New York chapter at a meeting here last week. Varying opinions were expressed on the other resale changes proposed, as reported in THE IRON AGE last week. These opinions will be sent, in letters, to OPA, through Herbert Segal, chairman of the local chapter.

The weight basis price to which the dealers particularly object is arrived at through a base price of 25c. per lb. for machines weighing over 18,000 lb. It was contended that application of the OPA's proposed schedule would require a 20 per cent deduction for cone driven machines, and the application of a 35 per cent rate to the remaining 20c. of the base price would leave a ceiling selling price of 7c. per lb. In the case of a machine weighing 20,000 lb., the resale price would be limited to $1,400. Allowance of $500 for dismantling, loading and freight would leave, the dealers complain, only $900 for purchase of the machine and advertising, cleaning and selling expenses.

Business Analysis Shows Machine Tools in Demand

Cincinnati

• • • **There seems to** be no let up in the steady, although unspectacular, demand for machine tools in this area. Manufacturers generally indicate that cancellations have definitely slowed up and that fresh bookings continue to outdistance the withdrawal of business. Analysis of business indicates that virtually all types of machines are in demand, and that backlogs will carry through the present year and in many instances well into next year. High production is continued, and while skilled labor, of course, is practically non-existant, personnel departments continue to find sufficient labor replacements to hold operations at present levels. Of course, the bulk of present labor replacements is of untrained men, but educational programs appear to be adequate to train these new men within a short space of time.

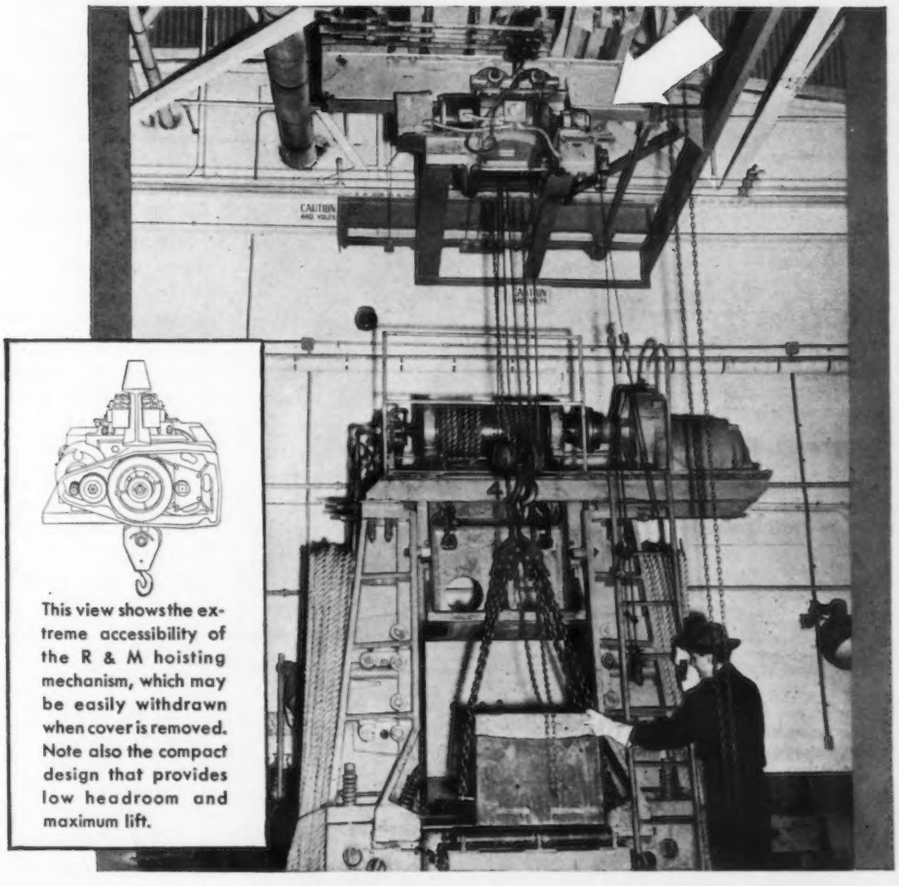
Forum At Pittsburgh Scheduled to Start April 8

• • • **The application** of electronics to metal working tools will be explained by electronic engineers as one of the features of the 1943 Westinghouse Machine Tool Forum, to be held at the company's East Pittsburgh, Pa., works, April 6 and 7. It will be the eighth annual forum sponsored by the company.

VULTEE

Speeds Work with NUMBER CENSORED R & M Hoists!

They Lift and Convey Heavy Units Quickly and Accurately



This view shows the extreme accessibility of the R & M hoisting mechanism, which may be easily withdrawn when cover is removed. Note also the compact design that provides low headroom and maximum lift.

WITH speed and perfection the double-barreled order of the day at the Nashville Division of Vultee Aircraft, Inc., materials, dies and assemblies must be *where* they're wanted *when* they're wanted. That's why Vultee—like hundreds of other leading war-busy firms—trusts vital lifting and conveying jobs to a squadron of R & M Electric Hoists.

Illustrated above is a typical R & M application. This 5-ton hoist, mounted on an overhead trolley, is removing a heavy die from a large drop hammer. It also serves several other hammers—a job that calls for the utmost in speed, safety and accuracy.

There are several reasons why R & M Hoists meet these specifications for performance. They're precision-built from track to hook; they're powered by famous R & M motors; they're perfectly balanced; they're equipped with an oversize oil-cooled automatic load brake. Hundreds of R & M models, from 1000 lbs. to 15,000 lbs. in capacity, are available to fit any application.

Whatever *your* hoisting problem, "take it up" with R & M! Our expert representatives will help you find the solution. Call the nearest R & M sales and service office, or write us.

R & M HOIST AND CRANE SALES AND SERVICE OFFICES

Albany . . . . . 364 Broadway	Denver . . . . . 1420 16th St.	New York . . . . . 200 Varick St.
Atlanta . . . . . 319 Walton Bldg.	Detroit . . . . . 2921 E. Grand Blvd.	Philadelphia . . . . . 401 N. Broad St.
Baltimore, Lombard & Concord St.	Houston . . 3715 Harrisburg Blvd.	Pittsburgh . . . . . H. W. Oliver Bldg.
Boston . . . . . 74 Needham St.	Jacksonville . . . . 305 Bisbee Bldg.	Providence . . . . . 44 Clifford St.
Chicago . . . . 2400 W. Madison St.	Meriden, Conn. . . . 135 Colony St.	San Francisco, 116 New Mtgmry. St.
Cincinnati . . . . . 418 New St.	Newark . . . . . 700 Bergen St.	Seattle . . . . . 216 Walker Bldg.
Cleveland . . 470 Rockefeller Bldg.		Syracuse . . . . 204 State Tower Bldg.

Montreal . . . . . Lyman Tube & Supply Co., Ltd.

KEEP 'EM HOISTING!

If you have R & M equipment, send for new maintenance folder, "How to get the most out of your Robbins & Myers Hoists and Cranes."

ROBBINS & MYERS • INC.

HOIST & CRANE DIVISION, SPRINGFIELD, OHIO • In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ont.

★ ★ ★ MOTORS • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878 ★ ★ ★

NON-FERROUS METALS

. . . Market Activities and Price Trends

Alcoa Looks Ahead for Post-War Applications

• • • **The Aluminum Co. of America** as a manufacturer of raw and semi-finished goods has to plan its post-war activities quite differently from companies selling consumer merchandise of manufacturing capital goods. The tremendous surge in aluminum capacity in this country—from an average production for the 10 years, 1929-1938, of 91,000 tons to 1,050,000 tons by the end of 1943—means there will be more aluminum available for civilian uses than at any time in the metal's history. Many new uses for the metal must be found and the older applications greatly expanded if this capacity is to be utilized and employment is to be maintained in the aluminum plants at as near war time levels as possible.

The most important factor is price. Throughout its history the price of aluminum has shown a downward trend. The metal entered the period of war preparation at 20c. a lb. and four price reductions have been made since then to bring the price of aluminum ingot down to an all-time low of 15c. a lb., with pig aluminum offered at 14c. a lb. With the basic price policy of Alcoa downward, lower prices may be anticipated.

The research and development divisions of Alcoa, while exercising every effort to develop new processes and new alloys designed to forward the war program are doing considerable planning of what may be termed an "imagineering" nature which will inevitably develop into post-war uses for aluminum. This is, of necessity, paper work for the plant facilities of the company are devoted 100 per cent to war production. For example, aluminum alloys of greater strength can be employed now in giving superior performance to war planes, but will also open up wider fields of application for the aluminum alloys after the war. Finishes, unique to aluminum, obtained by chemical and electrochemical treatments, and synthetic resin coatings are being developed and applied in the finishing of aircraft and other military equipment; they will also make aluminum more useful later in civilian applications. A backlog of new ideas has accumulated, and investigation of these will be undertaken as soon as the war emergency permits, so that when aluminum is again available for civilian use, the potential field of application will be markedly widened.

It should be noted that at this time no aluminum is available for experimental work unless the work is directly related to the war program. When the tide of the war has definitely turned, it is felt that the government will permit and encourage the use of various metals for construction of experimental and test models. This work must be started as far as possible in advance of the actual end of hostilities.

The Aluminum company is finding many ways in which plastics and other new materials may supplement and promote the use of aluminum. Among the plastics are materials which, in conjunction with aluminum, will often do a better job than either material can do alone.

Whether or not aluminum will figure prominently in the construction of the automobile of the future will depend on the type of car that will be manufactured. The first post-war cars will undoubtedly look pretty much like the 1942 models from a design standpoint, and the real post-war car will not appear until enough time has elapsed for proper development. Indications are that aluminum, magnesium and plastics will be the three principal new materials of construction.

The use of aluminum in trucking equipment is simply a matter of arithmetic. For every pound of dead weight saved, a pound of payload generally can be added. Operators, realizing this, used aluminum before the war but the truck promises to be a market for even greater applications of aluminum after the war.

Aluminum long ago had been found to be a desirable metal in marine construction. The use of aluminum for entire superstructures, small boats, davits, fittings, bulkheads for passenger quarters and other applications, allows a redistribution of weight in such a manner that the ship will function as a more efficient unit.

Life boats represent an interesting development. At the beginning of

BEFORE AND MAYBE AFTER: This clamshell dredge, of pre-war vintage, is made of aluminum primarily to save weight. It carries a 240 ft. boom with a 150 ft. aluminum alloy peak section.

NON-FERROUS METALS

USE OF ALUMINUM BY INDUSTRY

	Nov., 1939	Dec., 1940	May. 1942	Estimate After World War II
Transportation	59,820	82,510	283,500	367,500
Cooking utensil	28,880	12,375	4,500	105,000
Electrical conductor	20,430	10,315	0	84,000
Mach'y & electrical appliance	30,640	18,565	27,000	126,000
Construction	16,340	10,315	13,500	94,500
Chemical	10,215	10,315	22,500	52,000
Foundry & metal working	8,170	47,445	85,500	94,500
Metallurgy	10,215	8,250	9,000	42,000
Food and beverage	12,255	4,125	0	52,500
Miscellaneous	8,170	2,062	4,500	42,000

the war there were about seventy all-aluminum life boats in service. Aluminum life boats are not only free from major maintenance problems, but they also serve to lessen the weight of the ship at a point where weight is not desirable; namely, near the top deck. The lesser weight, therefore, increases the stability of the ship, and is more practical.

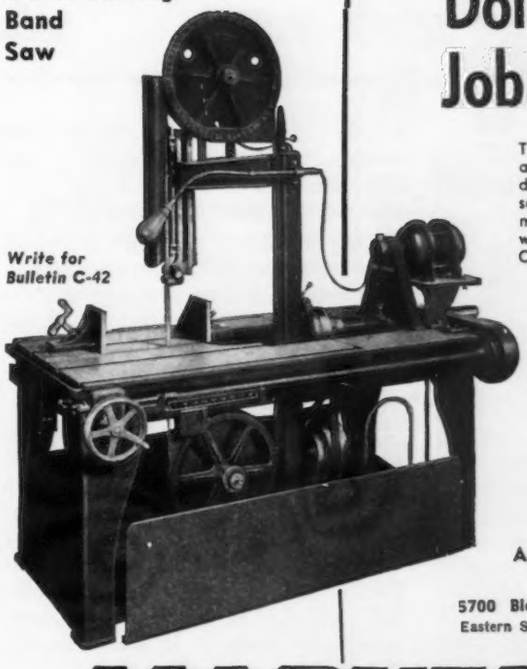
Extensive application of aluminum in architecture is about twelve years old, yet this field has barely been touched. There have been a number of dramatic installations, but on the whole, there are many applications of aluminum in architecture which remain to be developed. One of these is the aluminum window sash for residential construction. Here aluminum has a definite future, because the aluminum sash is efficient, permanent, easy to handle and presents no problems of maintenance.

More aluminum will be used on freight equipment. Thorough tests have been made with aluminum hopper cars for coal and sulphur transportation. Sulphur attacks steel rather rapidly, but has no effect on aluminum. All coal contains a certain amount of sulphur, and this substance in the past has been a problem to railroad officials.

The aluminum beer barrel should be in great demand at the close of the war. A typical half barrel of aluminum weighs only 18 lb., whereas a wooden barrel of the same capacity weighs 65 lb. The aluminum barrel does not have to be pitched, since aluminum in no way affects the beer.

The above breakdown of the use of aluminum by industry shows the use of the metal before the entry of the United States in the war, after entrance and an attempt to estimate post-war markets.

Marvel No. 8 *Metal-Cutting* Band Saw



Write for Bulletin C-42

Doing its War Job Well!

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well." The MARVEL No. 8 Metal Cutting Band Saw (capacity 18" x 18") will snip off an ⅛" drill rod, rough out the largest billet or cut a perfect 45° mortice on the end of a large I-beam without any special setting-up. Its large planer type bed takes all work. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large removable vise and a combination hand and/or power feed.

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U.S.A.
Eastern Sales Office: 225 Lafayette St., New York

MARVEL SAWS

★ ★

Manufacturer, in business for over fifty years, with large well equipped shops, located on Eastern seaboard, competent engineering department, National sales connections and ample capital is interested in additional products to manufacture at termination of war on account of greatly enlarged facilities. Plants are completely equipped with highest grade large machine tools, heavy cranes, and suited to precision manufacture and assembly of heavy machinery.

Any proposals made will be given careful confidential consideration.

ADDRESS BOX V-516

Care *The Iron Age*, 100 E. 42nd St., New York

★ ★

SCRAP

. . . Market Activities and Quotation Trends

Movements Spotty; Alloys to Be Forced

• • • **The scrap market** this week continues spotty, being affected by local conditions, and still suffers from a seriously handicapping labor shortage. One Buffalo operator reports that one of three one-eyed workmen in his yard has been classified as 1-A in the draft and complains that everybody talks about helping the scrapyard labor situation but nobody—not even the draft boards—does anything about it. The flow is reported variously as being normal or at least not causing any tight spots although weather conditions have had a slowing effect in several areas.

The Chicago area cites the most serious supply situation stating that immediate action is the only way to forestall a critical shortage this Spring. Allocations are reported increasing there. The St. Louis area is believed to be facing a similar situation with counterparts in Buffalo and Detroit shortly, mostly due to manpower shortages in the latter two areas.

Some mills report 60 to 90 day supplies which better the American Iron & Steel Institute's report that scrap in mill yards on Jan. 1 was equal to a 4½ week supply. Their figure shows a decided improvement over March of last year when the mill supply stood at two weeks. A national average of 30 to 35 days supply is only normal and does not reflect any overabundance from which to draw excessive optimism. Too little attention has been shown for the scrap supply since the extreme tightness of the situation eased and a great awakening is coming if efforts are not started quickly on both collections and the manpower shortage.

Bearing out a prediction made last week in THE IRON AGE, the Iron and Steel Advisory Committee of the Steel Division came through with a recommendation calling for the producers of alloy ingots to be required to use alloy turnings in an amount at least equal to 8 per cent of their monthly ingot capacity. These turnings are to be allocated to alloy producers by the Steel Division.

Another recommendation required that all users of carbon steel turnings be required to check the analyses closely to prevent the inadvertent waste of alloys. Steel companies were also asked to continue to buy their full requirements at ceiling prices.

The committee was able to report that 32,355 tons of alloy turnings had been allocated during February, reflecting an increase of nearly 30 per cent over the January and cited hopes of allocating 100,000 tons of alloy turnings monthly soon.

An interesting observation comes from some Eastern dealers who point out that turnings at their $13.75 base are $5 per ton less than household scrap, 75 per cent of which they claim to sell as No. 2 Bundles at $18.75, and that since turnings contain less foreign material than most household scrap, it is more feasible to solve the turnings situation than to hold household drives.

•

Scrap Merit Award Goes to Cleveland Firm

• • • **The WPB Merit Award** Pennant for outstanding performance in moving scrap materials was awarded recently to the M. Cohen & Sons Co., Cleveland. This award was believed the first such pennant to be given in the United States, and is expected to be as coveted as the Army-Navy "E" awards.

Because of the war a great number of their employees were lost to the armed services and other war industries. The remaining employees increased their work week to 60 and 72 hours. Present yard and facilities covers some 15 acres and the company serves more than 100 steel mills and foundries, shipping from the yards more than 1000 tons of scrap metal daily.

•

Inventories Top Quota

• • • **Scrap collections** of iron and steel during the last six months of 1942 were 95.7 per cent of the national quota of 17,000,000 tons, Paul C. Cabot, director of the Salvage Division, said last week.

During the last half of 1942, a total of 14,800,000 tons of iron and steel scrap were shipped to consuming mills and nearly 1,500,000 net tons of scrap were in the hands of suppliers ready for shipment to consumers. Total of available stocks of purchased scrap on Dec. 31, 1942, amounted to 6,160,000 net tons which, together with 1,600,000 net tons of home scrap, brought total visible stocks of iron and steel scrap to 7,760,000 net tons at the end of the year. This inventory was substantially in excess of the 7,000,000 net tons of stocks which was the objective set last summer.

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January Scrap Needs Fourth Largest in History

• • • **The consumption of** iron and steel scrap in January is estimated by the Institute of Scrap Iron & Steel, Inc., as 4,753,000 gross tons. This compares with 4,693,000 gross tons in December, and 4,590,000 in January, 1942. It is the fourth largest month in history. About 55 per cent of the January consumption was home or recycled scrap, while 45 per cent was dealer or purchased scrap.

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Lukens Head Named to WPB Steel Division on Scrap

• • • **Robert W. Wolcott,** president of Lukens Steel Co., Coatesville, Pa., last week was appointed by H. G. Batcheller, director of the WPB Steel Division, as a special assistant to handle problems of procurement, allocation and use of iron and steel scrap.

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CINCINNATI—The market appears to be much easier than at any time in the last year. Mills are reported to have 60 to 90-day inventories and some dealers indicate that foundry consumers have refused offerings on the ground that they have adequate inventory. The flow of material seems to be adequate for present demands, although country collections are reported slow.

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BOSTON—Ten to 12 in. of snow fell in New England March 6 and 7, thereby making yards' shipments temporarily nil. Previous to the storm there was a slight improvement in yard activity. Some scrap is going to Warren, Ohio, from Providence on a $7.35 freight rate, which is taken as evidence the mill there, at least, is urgently in need of scrap. General opinion among yardmen is that there will be a real shortage of automobile scrap in 1943. Virtually all scrappers here have gone out of business, leaving many cars to be salvaged.

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BUFFALO—Scrapyards reported nearly normal operations this week, with no shortage anywhere and mill reserves in excellent condition. Turnings continue to

be a problem, the district's largest buyer adhering to its embargo.

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PITTSBURGH—Dealers' scrap is still not coming out in any large quantities here and has been affected adversely by the weather. On the other hand, no tight spots have developed since industrial scrap, is making up for the lack of dealers' material.

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ST. LOUIS—Unseasonably cold weather with snow has made it difficult to handle scrap, slowing up shipments and fabrication in yards. Shortage of manpower continues serious, yard operations being 50 per cent, or below, of capacity.

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BIRMINGHAM — Although steel mills have large inventories on hand, movement of scrap to dealers has fallen off to a dribble. Dealers' presses are being operated for one shift only, and unless receipts show a substantial increase the scrap situation in this area is likely to become serious from an operations standpoint in four to five months.

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PHILADELPHIA — Demand is picking up somewhat, except in foundry grades and machine shop turnings. There is also a surplus of heavy forged turnings for electric and acid furnaces, with electric furnaces apparently well stocked with scrap. Little scrap is coming in, but dealers here, pondering future scrap supply, point out that turnings cost $5 a ton less than household scrap and do not contain the waste sometimes present in drive scrap. Their conclusion, concurred in by several mills, is that it is more feasible to solve the turnings problem than to hold household drives.

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NEW YORK—Scrap is both coming in and moving out slowly, though some dealers report slightly bigger demand. Labor continues to be a problem, with the promise of growing worse.

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CHICAGO—Steel mill scrap buyers in this area described the supply position as being extremely serious and one requiring immediate action if a shortage is to be prevented this spring. Most scrap consumers report having been forced to eat into reserves continually since mid-December in order to make up deficiencies in shipments. Causes of the slowdown in shipments is attributed largely to cold weather and lack of manpower.

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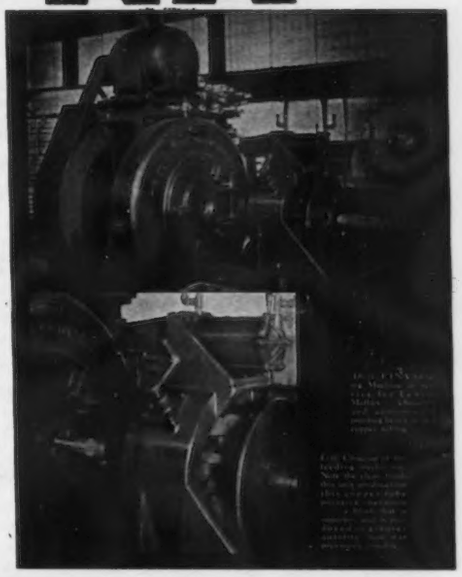
CLEVELAND—Scrap supplies in the Cleveland area are holding up fairly well with mill stocks estimated to be between seven and eight weeks. However, the Valley district is considerably worse off, with allocations from other parts of the country required almost weekly to bolster up the supply. Allocations from the Buffalo district, as well as the South, have been made to Valley mills within the past few weeks.

LEWIN-MATHES *Got the right answer at*

ETNA



They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

Symbol OF INTEGRITY

GATX
GENERAL AMERICAN

100% Devoted to War Production

PLATE & WELDING DIVISION
PLANT AT SHARON, PA.

Plate and Welding Division
GENERAL AMERICAN TRANSPORTATION CORPORATION
SHARON, PA.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt; No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings, Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on trucks. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.65 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville. Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest priced grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.0
Clean auto cast	18.00	19.00	20.0
Unstripped motor blocks	15.50	16.50	17.5
Stove Plate	17.00	18.00	19.0
Heavy Breakable Cast	15.50	16.50	17.5
Charging Box Size Cast	17.00	18.00	19.0
Misc. Malleable	20.00	21.00	22.0

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo

. . . Comparison of Prices

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Mar. 9, 1943	Mar. 2, 1943	Feb. 23, 1943	Mar. 10, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Mar. 9, 1943	Mar. 2, 1943	Feb. 23, 1943	Mar. 10, 1942
No. 2 fdy., Philadelphia	$25.89	$25.89	$25.89	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.375	7.375	7.375	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 150 to 154.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Mar. 9, 1943	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.30467c.,	2.30467c.,	$23.61	$23.61	$19.17	$19.17
1942	2.30467c.,	2.30467c.,	23.61	23.61	19.17	19.17
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes[3]	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled[5]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester—3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	$4.50		$4.50												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.39¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth—2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢[13]	2.27¢	2.40¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢[13]	2.27¢		2.49¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit—2.70c)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70c				2.70¢	Bethlehem, Massillon, Canton—2.70c)						2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
							(Coatesville and Claymont—2.10¢)								
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢[11]		2.47¢	2.65¢	2.33¢	2.30¢	2.15¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester—2.70c)					3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester—3.30¢)					3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [11] Ship plates only. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

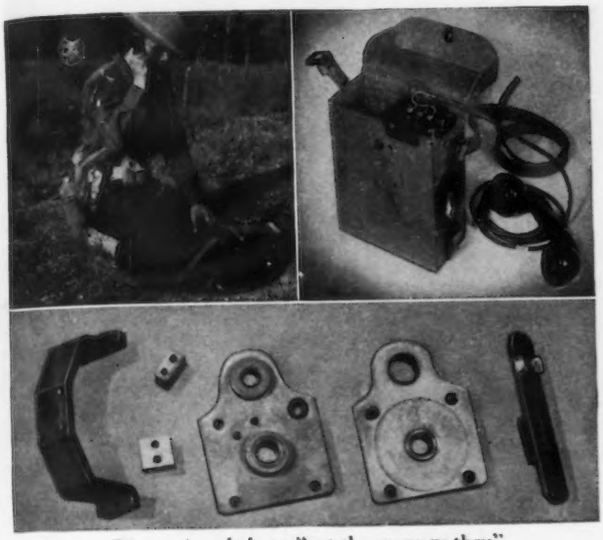
GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars. Phoenix Iron Co. may quote 2.40c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8 in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.35c., established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMI-FINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; and lend lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

FOR WAR TODAY—FOR YOUR PRODUCTS TOMORROW

PRE-WAR ENGINEERING SHOWED THE WAY



Die castings help to "get the message thru"

Unhampered by tradition, the designers of communications equipment have taken full advantage of all developments in materials and production methods. It is of particular significance, therefore, that zinc alloy die castings have found such wide use in the manufacture of communication and allied products.

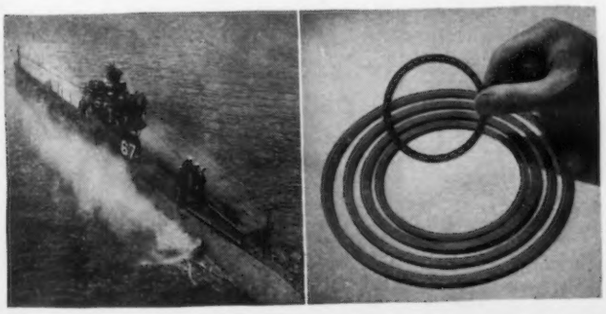
The wartime counterpart of the communications industry—the U. S. Army Signal Corps—is profiting by pre-war advancements in telephone production. For example, the EE-8-A field telephone utilizes the six zinc alloy die castings shown at the bottom of the above illustration. These castings were adopted only after exhaustive testing in competition with parts produced by other methods and of other materials.

Post-war designers please note.

5 IN 1

Pictured below are five bezels for gauges on submarines. They are die cast of zinc alloy and, at first glance, you may ask why. The answer is elimination of scrap loss—a major problem in all metal production today. Actually, by die casting all five rings in a single die, they are produced at little more expense than would be involved in die casting the largest ring alone. The individual rings are broken off the gate and the small amount of metal which joined them is remelted and reused.

Compare these savings with the scrap loss involved in the alternative method of stamping from sheet metal, and you can understand why the die casting process was selected.



The small cored holes in the rings permit grip of a spanner wrench for assembly

THE New Jersey zinc° ALLOY POT

A publication issued for many years by The New Jersey Zinc Company to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

IRON AGE EDITION **No. 7**

BAKED FINISHES FOR ZINC ALLOY DIE CASTINGS

Almost any known type of finish can be applied on zinc alloy die castings. The wartime shortage of electro-plating materials has, however, focused attention principally on organic coatings, of which there are many types to meet specific service requirements of die castings. In the case of baked finishes on zinc alloy die castings, the relatively low melting point of the alloy should be kept in mind. Finishes on zinc alloy die castings should not be baked at temperatures higher, or for periods longer, than indicated in the table below.

The subject of finishing is fully covered in the bulletin "The Finishing of Zinc Alloy Die Castings and Rolled Zinc." A copy will be sent to you upon receipt of a request on your Company letterhead.

	MAXIMUM TEMPERATURE –°F. FOR TOTAL BAKING TIME OF			
Alloy	*½ Hour*	*1 Hour*	*2 Hours*	*3 Hours*
* Zamak 2†	325	275	250	250
Zamak 3††	425	375	325	300
Zamak 5†††	425	375	325	300

* Trade Mark Reg. in U. S. Patent Office
† Corresponds to A.S.T.M. Alloy XXI, S.A.E. No. 921
†† Corresponds to A.S.T.M. Alloy XXIII, S.A.E. No. 903
††† Corresponds to A.S.T.M. Alloy XXV, S.A.E. No. 925

THE NEW JERSEY ZINC COMPANY 160 FRONT ST. NEW YORK CITY
HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
7/16 in. and smaller		64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *Per Cent Off List*

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect new 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	***$25.53***	***$25.03***	***$26.53***	***$26.03***	.....	.....
Brooklyn	*27.65*	.....	.....	*28.15*	.....	.....
Jersey City	*26.62*	*26.12*	*27.62*	*27.12*	.....	.....
Philadelphia	*25.89*	*25.39*	*26.89*	*26.39*	.....	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	$29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati	*24.68*	*24.68*	.....	*25.18*	.....	.....
Canton, Ohio	*25.47*	*24.97*	*25.97*	*25.47*	.....	.....
Mansfield, Ohio	*26.06*	*25.56*	*26.56*	*26.06*	.....	.....
St. Louis	*24.50*	*24.00*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....	.....331 ½
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	.....	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	.....	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$28.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	.....	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*27.25*	.....	.....	.....	.....	.....
San Francisco	*27.25*	.....	.....	.....	.....	.....
Seattle	*27.25*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace.....$23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.05 to 0.075 per cent nickel content and $1 per ton extra for such additional 0.025 per cent nickel.

WAREHOUSE PRICES *(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)*

CITIES	SHEETS			STRIP		Plates (¼ in. and heavier)	Structural Shapes	BARS			ALLOY BARS		
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	Cold Drawn 3100
Pittsburgh	$3.35	$4.00	$4.75	$3.60	$3.20	$3.40	$3.40	$3.35	$3.65	$7.45	$5.75	$8.40	$6.75
Chicago	3.25	4.10	4.85[1]	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia	3.55	4.63	4.90	3.95	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.58	7.18
New York	3.58	4.60[2]	5.00	3.96[6]	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.18
Detroit	3.43	4.30	4.84[1]	3.43	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.08
Buffalo	3.25	4.30[1]	4.75[4]	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston	3.71	4.68	5.11	4.06	3.46	3.85	3.85	3.98	4.13	7.77	6.07	8.91	7.28
Birmingham	3.45[3]	....	4.75[1]	3.70[3]	....	3.55[3]	3.55[3]	3.50[3]	4.43	....	....	....	....
St. Louis	3.39	4.24[2]	4.99[1]	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee	3.38	4.23[2]	4.98[1]	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.99
Baltimore	3.50	5.00	5.05	4.00	....	3.70	3.70	3.85	4.04	....	....	....	....
Cincinnati	3.42	4.37[2]	4.92[1]	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk	3.85	4.50	5.40	4.10	....	4.05	4.05	4.00	4.15	....	....	....	....
Washington	3.60	5.10	5.15	4.10	....	3.80	3.80	3.95	4.03	....	....	....	....
Indianapolis	3.45	4.25	5.01[1]	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.17
Omaha	3.85	4.77	5.52[1]	4.20	....	4.15	4.15	4.10	4.42	....	....	....	....
Memphis	3.85	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.75	5.43	5.25	4.30	....	5.25	5.25	3.75	4.50	....	....	....	....
Los Angeles †	4.95	7.15	5.95	4.90	....	4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
San Francisco †	4.55	7.55	6.60	4.50	....	4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
Seattle †	4.65[7]	6.63	5.70[7]	4.25	....	4.75	4.45	4.20	5.75	....	8.00	....	....

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.
† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.